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EDITOR'S PREFACE.

IN accordance with the recommendations of the Special Committee of the 7th April, 1891, as approved by the Council, it is proposed that the scope of the Journal, which is now placed under the immediate direction of one responsible Editor, shall gradually be developed, and shall embrace the following subjects :—

1. Lectures read before the Institution, with an account of the discussions thereon.
2. Occasional Papers, being original essays, or compilations, on subjects of interest to the Navy or Army, which have not been read before the Institution in the form of lectures.
3. Foreign Section, embracing more or less extended translations or *précis* from foreign books, periodicals, &c.
4. Naval and Military Notes on important changes in matériel, organization, administration, and drill, and notices of manœuvres, in foreign navies and armies, and, so far as practicable, in the British and Colonial Services.
5. Notices of Contents (important articles only) of some of the principal foreign naval and military periodicals of the previous month.
6. Notes and Queries. (This section will not be opened at present.)
7. Notices of New Books of interest in English and other languages, and occasional reviews.

To carry out the above programme, in addition to taking general charge of the Library, is manifestly more than one man can attempt single-handed.

The Editor has been fortunate enough to secure the generous assistance of a well-qualified naval Officer, who has consented, for the present, to supervise the Naval Notes, and several naval and marine Officers have been good enough to undertake to write Occasional Papers,

supply information, or translate matter from foreign naval and other periodicals; it is therefore hoped that with their help, and that of other Officers who may be disposed to furnish contributions, the Journal may be made to supply a want which has long been felt in the Navy, and may receive increased support from Officers of the Service who are anxious to keep themselves *au courant* with progress in naval matters.

With regard to the land forces, the Editor trusts that Officers of all arms will assist him in endeavouring to raise the standard and increase the usefulness of the Journal by contributing articles, whether original, compiled, or translated, which seem likely to be of interest to the Service at large, and are of sufficient importance to be worthy of insertion in its limited pages.

In order that important articles may be noticed which have appeared in the foreign periodicals of the previous month, the Journal will not be published until the 15th of each month.

With the object of facilitating printing and avoiding all unnecessary correspondence, the Editor begs that the following rules may be observed:—

1. All writing should be fairly legible, and, if possible, in ink.
2. Only one side of the paper should be written on.
3. Proper names (*e.g.*, names of persons, places, ships, titles of books) should be written in printed characters (not necessarily capitals).
4. Pages should be numbered.
5. Communications should be as brief as possible.

All correspondence regarding the Journal and books for review should be addressed to "The Editor."

C. W. Bowdler, *Colonel,*
Editor.

Friday, January 20, 1893.

VICE-ADMIRAL P. H. COLOMB, Member of Council, in the Chair.

THE SYSTEM OF MOUNTING AND PLACING GUNS ON BOARD SHIPS OF THE ROYAL NAVY.

By H. O. ARNOLD-FORSTER, Esq., M.P.

IT must, I fear, appear very presumptuous on my part as a civilian, and an unprofessional civilian, to attempt to deal with a matter which is primarily a naval question, and in the second place a question of naval architecture.

My excuse, as far as I have any valid excuse, is to be found in the fact that I intend to approach the subject from the point of view of an unprofessional outsider who thinks that he sees in the arrangements which he criticizes something not in accordance with common sense, and who wishes to test the accuracy of his observation by submitting the results of it to the ordeal of a trained audience such as the present.

My opportunities of observation have not, of course, been comparable with those of the Officers who are in this room. At the same time, I am not without materials on which to base my comparisons, and on which to found my arguments.

There are, indeed, very few ships in the Royal Navy which I have not been on board of, and nearly all the modern ships I have visited during their construction, as well as since their completion. I have a very fair knowledge both of foreign war-ships and of foreign dockyards, and, owing to the kindness of naval and military Officers, I have many times been at sea, both in our own and foreign ships, and have witnessed experimental trials both of guns and engines, and have thus added some slight practical knowledge to the results of whatever theoretical study of these subjects I may have made.

I mention these personal matters in order to extenuate in some degree the rashness of my undertaking, and to convince you that I am not trespassing on your time without having given some attention to the matters about which I desire to obtain your opinion.

My proposition, broadly stated, is that, *taken as a whole, the existing arrangements for the mounting and placing of heavy guns in the Royal Navy are faulty, and require amendment.* This might seem, on the face of it, an extreme and almost absurd proposition, if it were not that the system of gun mounting and distribution which we have adopted, though not absolutely peculiar to our navy, has not been followed by some of the principal naval constructors in the world.

The two systems, our own and that of any other navy—say, the French—may be equally good, but it is obvious that each is the result of a different train of thought, and that each represents a distinct theory. For reasons which I am about to give, I have been led to the conclusion that the system which we have adopted is not based upon such sound principles as that which has found favour in the French navy.

There are two main points upon which I wish to dwell, two principal errors, as I take them to be, which I wish to combat. The first relates to the placing of the guns on the ship's deck, and the second to the height at which the guns are carried above the water line. Generally speaking, it may be said that the universal rule adopted during the last few years, with respect to British ironclads, has been to place the guns in pairs in a turret or barbette. There are, of course, exceptions, as, for instance, the single guns in the "Benbow," and the sponsoned guns on the "Impérieuse" and "Warspite." But, practically speaking, the above is the universal rule.

Now, admitting all the advantages which are claimed for this arrangement, and I think I am fully aware of what they are, I contend that the arrangement is thoroughly and intrinsically bad, contrary to common sense, and consequently unscientific.

Let us see what is said in favour of the arrangement. It is said, in the first place, that weight for weight we get more value for the single 2-gun turret or barbette than with two turrets or barbettes each carrying a single gun.

The fact is indisputable. A circular turret which will hold one gun requires a very slight addition to its diameter to accommodate two.

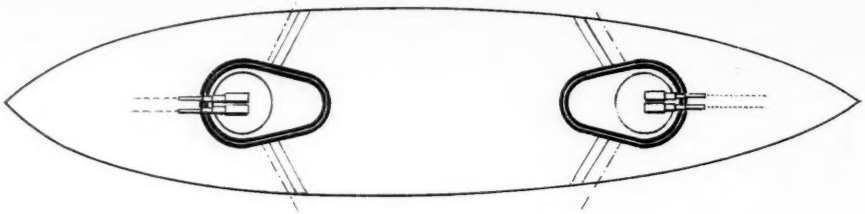
The weight of two single turrets is greatly in excess of one double one. If it could be shown either that a battle-ship could not be built to carry four protected guns in four different positions, or that the loss of power, in one shape or another, involved in the adoption of such an arrangement, was so great as to compel the constructor to produce a very inferior ship, then I admit that the argument of *weight* would be very forcible. I will shortly consider what is its real value. Before doing so, however, I will pass to another claim which is made on behalf of the double-barrelled system. It is said that by its adoption the greatest obtainable amount of security is given to the ammunition lifts and loading gear, and that the distribution of the guns means exposure of these important parts. It is obvious, however, that such an argument as this depends not on the question of whether the guns are coupled or not, but upon the position and mounting of the guns, whether double or single.

I have also heard it contended that our plan of mounting two guns close together gives a greater protection than the system adopted in some foreign men-of-war (for instance, the German "Beowulf"), where a heavy gun is placed at each extremity of a large armoured enclosure with only a slight protection overhead.

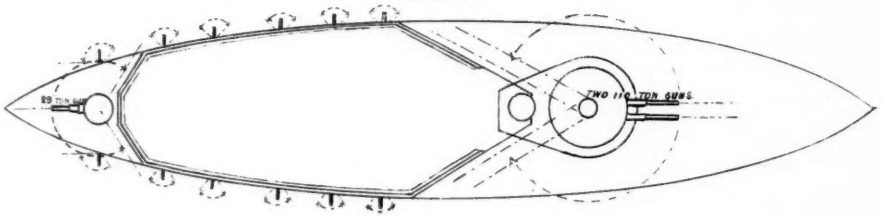
It has been pointed out to me that the effect of the massive

PLATE TO ILLUSTRATE MR. ARNOLD-FORSTER'S PAPER.

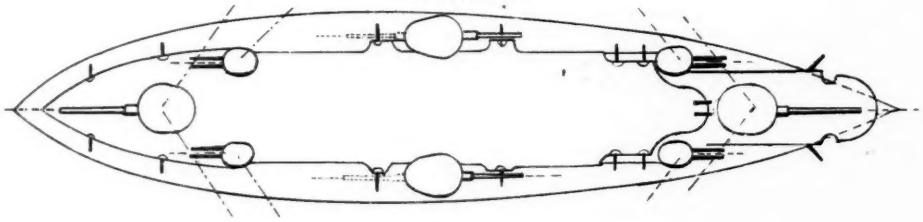
"RODNEY."



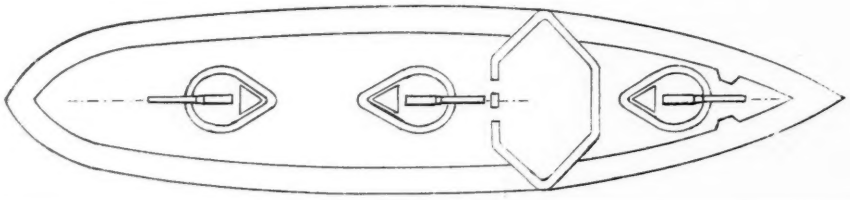
"VICTORIA."

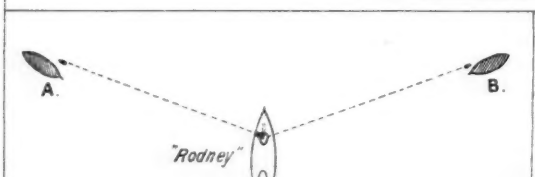


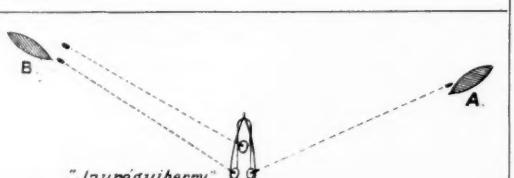
"JAUREGUIBERRY."



"FORMIDABLE."







HARRISON & SONS, LITH., ST. MARTIN'S LANE, W.C.

breeches of the two heavy guns, as mounted say on the "Howe," is to close up the interior of the barbette against shell fire; whereas, in the "Beowulf" the smallest shell bursting between the guns may do great damage. I admit that, to a certain extent, the breech of a gun may be made to serve in the place of an armour plate, and also that the method of mounting adopted on the "Beowulf" is by no means a good one; but hard cases make bad law, and there is not the slightest necessity for selecting as our pattern the least satisfactory compromise between the two systems which has yet been adopted in any navy.

But I think I shall be able to show that, even admitting that the double-barrelled system confers some slight advantage in the matter of weight, and that certain ships in foreign navies depart from our system, and are losers thereby, my main contention is still correct. I think I shall be able to show that the essential disadvantages of the system are so serious, as to entirely outweigh any such slight merits as those referred to above.

In order to illustrate my argument, I will at once pass to the comparative method, and I will put side by side typical ships in which the double-barrelled mounting is respectively adopted and avoided.

I have selected for purposes of illustration and comparison four ships, two British and two French, which I have taken as typical of the two schemes of arrangement respectively adopted in the two navies.

The ships, of which you will see the plans on the screen, are the "Rodney" and "Victoria" for England, the "Jauréguiberry" and the "Formidable" for France.

What I wish to convince you of, is that the arrangement of the guns in the first two ships is bad *per se*, and infinitely inferior to that adopted in the two latter.

Let us consider what are the conditions which inevitably attach to the English plan. The "Rodney" and the "Jauréguiberry" are both 4-gun ships. I refer of course to the heavy guns only. Now consider the powers of the two ships in action.

The "Rodney" can bring to bear four guns on either broadside. The "Lazare Carnot" has, it is true, only three guns available on either broadside, but, on the other hand, she has three guns available for a running fight when she is stern on.

I think few Officers will deny that, in all probability, actions between ironclad ships will frequently, if not generally, be actions fought end-on. For such an action the French ship has a distinct advantage. But the advantages of the French mounting by no means end here. The two forward guns of the "Rodney" are mounted on the same turntable. They have, it is true, a wide arc of training, viz., 30° abaft either beam. Such at least is the case in theory, though I doubt whether when loaded with full battering charge they have ever been fired, or could safely be fired, at 30° abaft the beam without serious danger to the superstructure.

But the training of one gun is of necessity the training of the other. The elevation of the two guns need not, of course, be the same, but it is hard to conceive the circumstances under which one

gun is likely to be fired with one elevation and the second fired at the same time with another.

It is practically *a double-barrelled gun, not two guns.*

Hence it follows that, with the forward guns bearing on the starboard bow, there can be no gun on the port bow, and *vice versâ*.

It is easy to see that this may be very serious. Imagine a ship like the "Rodney" engaged with two adversaries of inferior size—say vessels of the "Thunderer" class—which take up their station, one on the port and the other on the starboard bow. The "Rodney," it is true, may bring her forward barbette guns to bear upon A, and if the gun be truly laid, A will no doubt be struck. But what is the advantage of striking her with both guns? Surely it is very slight. I remember in the Franco-German War it was stated that some of the men attacking the French position at Gravelotte received in their bodies the full discharge of what were then the new mitrailleuses. There was no distributing or traversing arrangement on the gun at that time. Well, no doubt a man with forty bullets through his body was likely to be put *hors de combat*. He was about as dead as he could be. But he was no "deader" than if a single bullet had done his business. Of course I do not say that more damage will not be done by the impact of two shots than that of one; but a 1,200-lb. shot from one of the "Rodney's" guns will do plenty of damage by itself, and I maintain that the gain of delivering a second shot at exactly the same time as the first is slight as compared with the loss which is involved in the inability to strike the other ship B at all until the whole turntable has been traversed through, say, 100°, the range found, and the elevation given on the starboard bow.

Compare this state of things with that prevailing on board the "Jauréguiberry." Here one gun, undisturbed by smoke or by conflicting orders addressed to a second gun's crew, will be brought to bear on ship A. At the same time, two guns will be brought to bear on ship B from independent positions. And of course the same conditions apply, *mutatis mutandis*, to an action fought astern.

But I have not nearly exhausted the disadvantages of the double-barrelled system. Everyone knows how conspicuous an object a big gun is on a modern ship, and how little protection is, or can be, afforded by either barbette or turret. The risk to the gun is one which must be accepted, but that is no reason why it should be magnified beyond all reason.

The distance between the chases of the "Rodney's" two guns is only 6 ft. 3 in. when they have the same elevation. At the breech they are practically in contact. It is hard to conceive that a projectile of any size striking one gun would not inevitably disable the other. It might not be so in a particular case, but the exception would be providential, and not to be calculated upon.

Moreover, I do not know whether Officers have ever considered the immense broadside target afforded by two 67-ton guns run out at different degrees of elevation (and, of course, while one is being loaded, its elevation is always different from that of the other).

In the French ship we have a totally different state of things. If

a gun be struck, it will be injured; if the gun's crew be wounded, there will be some confusion; if the gun be disabled, there will be a loss in the fighting power of the ship. But there will be an end of the matter. There will still be available two guns for forward fire, two for stern fire, three on one broadside, and one on the other. The crews of the other guns will not be interfered with, and will continue to work them. How different would be the case on the "Rodney" in the event of one of her forward guns being struck by a heavy projectile, and in the almost certain event of the damage to one gun involving the disablement of the other! For be it remembered that even a slight blow on the loading gear of a gun will disable it, and that the loading arrangements of the two guns are practically in contact. The result of such a blow would be the absolute blotting out of the "Rodney's" heavy gun fire over an arc of 120°, and in reality over a much larger arc.

Not a single shot can be fired ahead without changing course; every shot fired, even approximately in the direction in which the ship is moving, can only be discharged by giving to the guns in the after barbette their extreme forward training.

I think it is hardly possible to conceive a more disastrous state of things following from the effect of a single shot.

I know what is said on behalf of the double-barrelled mounting. I think that, as a rule, the defects of the system, such as I have described them to be, are admitted; but it is contended that the absence of certain disadvantages supposed to be indisputably associated with the alternative arrangement more than compensates for any disadvantage.

I have already briefly alluded to some of these real or supposed disadvantages. I now propose to examine them somewhat more in detail.

It is said that the double-barrelled system allows of protection being given to the guns, with scarcely any addition to the weight needed to protect a single gun. The fact is indisputable, but the question is, whether it is as important as some people suppose.

Can four heavy guns in protected positions be carried on a sea-going man-of-war without materially diminishing her efficiency? I think there can be but one answer to that question. Unquestionably they can. I am not concerned to go into a regular constructors' battle over the precise merits of such ships as the "Lazare Carnot," the "Jauréguiberry," and the "Formidable," but I do not think any one will seriously contend that they are weak ships, or ships manifestly inferior to vessels of an equivalent class in our own navy.

Here are some of the particulars with regard to the protection afforded on some of the French ships which have their guns distributed:—

	"Jauréguiberry."	"Lazare Carnot."	"Charles Martel."
Tonnage....	11,818 tons.	11,986 tons.	11,882 tons.
Armament..	2 12-in.	2 12-in.	2 12-in.
	2 10¾-in.	2 10¾-in.	2 10¾-in.
	8 5½ Q.F.	8 5½ Q.F.	8 5½ Q.F.
Armour	Complete belt, 18 in. thick, tapering to 11 in. thick.		
	Armoured deck, 2¾ in.		
	Coffer dam, 4 in.		
	Armour on turrets, 14½ in.		
	Armour on turrets for 5½-in. guns, 4½ in.		

"*Formidable*" and "*Amiral Baudin.*"

Tonnage.....	11,441 tons.
Armament.....	3 75-ton guns, 12 3-ton guns.
Armoured belt	21½ in. to 13¾ in.
Armoured deck....	3 in.
Armour on turret..	17¾ in.

The secondary battery of the "Formidable" is badly protected, but that is not an essential feature in the distribution of the guns.

"*Hoche.*"

Tonnage.....	10,581 tons.
Armament....	2 54-ton guns, 2 28-ton guns, 14 3-ton guns.
Armour	Armoured belt, 18 in.
	Armour on turret, 16 in.

It can hardly be pretended that any of these are weak or ill-protected ships.

I think, therefore, that the argument based upon weight as affecting protection is not entitled to prevail. If we want to have four isolated protected guns we can have them.

But I have heard other objections taken to the French system. I have heard it alleged that in the "Marceau" the disposition of the guns is exceedingly faulty because the tops of the shot lifts are above the armour. The fact is as alleged, and, no doubt, in this particular the construction may be improved. Not only may it be improved, but it has been improved in other ships.

The exposure of the ammunition hoists is not, in any sense, an essential or an unavoidable incident of the separation of the guns.

Then I have heard it stated that the sponson mounting has another great disadvantage, and the "Marceau" has been held up as a conspicuous example of the fault. It is said that it is impossible for the "Marceau" to fire her heavy sponson guns and her broadside guns, when trained forward, at the same time. It has been stated that the blast of the heavy gun must destroy the gunners at the 6-in. guns on the broadside forward or abaft the muzzle as the case may be. In support of this statement the experiences of the "Impérieuse" and "Warspite" are recalled. Now there are two answers to this objec-

tion. In the first place, even if the consequences of firing were as serious as is alleged, I still maintain that as an argument against the distribution of guns it is quite inconclusive. How often is the ship likely to be firing her three 70-ton guns right ahead, and at the same time to be under the positive necessity of firing her 6-in. broadside guns? It is hardly conceivable that the occasion should ever arise. The firing of the heavy guns right ahead assumes that the ship is chasing. The broadside guns, with the exception of the forward guns on either side, cannot be brought to bear straight ahead. They would therefore be available only for firing on the beam, and, *ex hypothesi*, that is not necessary.

But there is a stronger argument than that of probability. It is not a fact that the "Marceau" cannot fire all her guns simultaneously with an extreme forward training. When the ship was just commissioned the difficulty did exist, but structural alterations have been made, the broadside guns have been protected, and the blast of the sponson guns does not interfere with them.

The experiment has been tried. It is only a short time ago since I was discussing this matter with a French gunnery Officer who had been on the "Marceau" when she was firing full charges under the conditions referred to. The thing was done, and no one was damaged. I asked him in the clearest terms what was the training of the guns, and he was equally clear in his assertion that the position was "la position la plus défavorable," adopted expressly to try the value of the new arrangements.

I say, therefore, that even in the "Marceau," a ship of very peculiar construction, the separation of the guns is not a disadvantage.

But I need hardly point out that the particular arrangement adopted in the "Marceau" is far from being the only or the best solution of the problem of how to separate the heavy guns.

In the "Formidable," one of the most powerful ironclads I have ever been on board, the arrangement adopted is that of three guns in the centre line of the ship, a plan which, I think, despite some drawbacks, has very much to be said for it.

We have no 3-gun ship in our navy, but we have, unfortunately, several 2-gun ships. I allude, of course, to the "Victoria," "Sans-pareil," "Hero," and "Conqueror." I think it would be hardly possible to conceive a more faulty arrangement than that adopted in these ships.

I have, elsewhere, in an imaginary sketch entitled "In a Conning Tower," endeavoured to illustrate the disadvantage of this plan of concentrating the whole heavy armament of a ship in a single barbette or turret, and that in the fore part of the ship. Indeed, I entirely agree with a distinguished Admiral who expressed to me his opinion that if it were necessary to adopt such a design at all it would have been better to have had the turret aft than forward. By placing the guns in the bow a great part of the value of the high speed which is given to these ships is taken away when they go into action, for they at once lose the power of fighting an action at a particular range which their Captains prefer.

In order to bring the guns to bear, the ship must be kept bow-on to the enemy, and thus it is impossible, by reducing or increasing speed, to preserve a given interval between the two combatants, for the interval will then depend upon the joint action of the two ships and not upon the Commander of the faster ship.

Moreover, it is painful to contemplate the almost certain result of a direct hit upon either of the heavy guns in such a ship as the "Victoria." Practically the entire heavy gun power of the ship will be put *hors de combat* at once. And under any circumstances the inconvenience and danger which must attend such a disposition of the guns cannot be exaggerated. Picture the "Victoria" with two ships attacking her, one on the port bow, the other on the starboard quarter. When the guns are bearing on the port bow the whole heavy armament of the ship, save on that particular point, is obliterated; and to bring the 110-ton guns to bear upon the starboard quarter means that the whole turret must be traversed over 200° of training.

Surely there can be no question that such ships as the "Indomptable," or "Jemappes," French 2-gun vessels, with one heavy gun forward and one aft, are infinitely better adapted for the purposes of war than such costly ships as the "Victoria" and "Sanspareil." For these reasons, therefore, I maintain my original proposition, namely, that the double-barrelled system of mounting heavy guns is essentially wrong, and should be abandoned. I am aware that many foreign ships have been constructed upon this plan. On the other hand, with rare exceptions, the ships of our most formidable rival have been built upon another system, a system which, in my opinion, is demonstrably preferable to our own.

I have appended to this paper a tabular statement showing the principal ships in foreign navies, classified according to the arrangement of their heavy guns.

I was interested to hear only the other day that the Austrian Naval Department, which has to make a comparatively small amount of money go a long way, has definitely decided against the double-barrelled system in the new armoured ships which it is about to build.

Before I conclude, I wish to say a word upon the second, and what I may call the subsidiary, part of my indictment. I believe that, not only is the distribution of our heavy guns on board ship unsatisfactory, but that we have committed ourselves to another grave mistake in adopting designs which involve the heavy guns being carried at only a few feet above the water-line.

It may be said that in this matter I am only forcing an open door, and that in their designs of the "Royal Sovereign" class, the Admiralty have given proof of their intention to abandon the erroneous plan adopted in the "Trafalgar," "Victoria," and the whole of the ships of the "Admiral" class. I trust that it may be so, but the fact remains that, at the present moment, we possess a very large number of low freeboard ironclads, carrying their heavy guns at from 8 to 20 ft. above the water, viz.:—

Agamemnon.	Devastation.	Nile.
Ajax.	Dreadnought.	Orion.
Anson.	Edinburgh.	Prince Albert.
Belleisle.	Glatton.	Rodney.
Benbow.	Gorgon.	Rupert.
Camperdown.	Hecate.	Sanspareil.
Collingwood.	Hero.	Thunderer.
Colossus.	Hotspur.	Trafalgar.
Conqueror.	Inflexible.	Victoria.
Cyclops.		

It may be that I am overstating the case, but I do not think I shall be when I say that the experience of almost every Officer is to the effect that it is impossible to fight these low-placed guns when steaming ahead in anything like a sea-way.

My own small experience, as far as it goes, is to the effect that over and over again, under the ordinary conditions of navigation, the condition of the sea will be such that ships like the "Rodney" will be unable to work their heavy guns, or, if able to work them at all, will be prevented from working them effectively, owing to spray, or even sometimes to green seas, when such ships as the "Royal Sovereign" and "Formidable" are perfectly free from water, and providing a thoroughly good gun platform.

Moreover, and this is a point on which I should greatly value the opinions of Officers, it seems to me that the danger of steaming against a head sea with a low freeboard ship when the guns are loaded and the tompions out must be very serious indeed. I should like to know whether the thing has been tried; and if so, whether any one has made a note of the amount of water that has accumulated upon the top of the charge. I should like to see the effect of firing a fully charged gun with 3 ft. of water upon the top of the projectile in some other navy than our own.

I have spoken of the difficulty of aiming the guns of the "Rodney" in a sea-way; but it must be remembered that the "Rodney" and the other "Admirals" are in a better position in this matter than any of the other ships named in the list above.

In the "Admirals" the heavy guns are as much as 20 ft. above the water-line, in the "Victoria" they are 15 ft. 3 in. only, in the "Nile" and "Trafalgar" 15 ft., in the "Agamemnon" 11 ft., "Devastation" 12 ft. 11 in., "Rupert" 11 ft., &c.; while in the "Royal Sovereign" class the height is 23 ft., in the "Brennus" 28 ft. and 21 ft., "Amiral Duperré" 25 ft., "Amiral Baudin" 28 ft., "Hoche" 25 ft., "Charles Martel" 32 ft. and 22 ft. 11 in., "Formidable" 28 ft., and "Marceau" 26 ft. 3 in. I think it will be admitted that the differences here indicated are sufficiently important to attract attention and to call for reflection.

I believe there is no Naval Officer who will not admit that for fighting purposes in all conditions of weather a gun high above the water-line is infinitely to be preferred to one placed low down. If the preference be well founded—and I am entitled to assume that it

is—and if the high command can in fact be obtained without a great sacrifice of protection, then it does appear to me incontestable that we have made a grave mistake in allowing the French constructors to get so great an advantage over us as is indicated in the figures I have given.

In conclusion, I submit the following eight points:—

1. That the adoption of double-barrelled mounting makes the objective of one gun absolutely determine the direction of the other;
2. That the double-barrelled system prevents a ship from engaging with its heavy guns on both sides simultaneously;
3. That the close proximity of the guns makes it probable that injury of one will involve injury of the other;
4. That any casualty to the crew of one gun will in all probability extend to the crew of the other;
5. That the chance of injury to the loading and elevating gear is greatly increased by the proximity of the guns to one another;
6. That the target presented by the two guns is unnecessarily large;
7. That the plan is *not essential* to the design of a powerful and protected sea-going ironclad; and
8. That the plan of arranging heavy guns near the water-line is calculated to prevent guns being aimed and worked in a sea-way.

Admiral CLEVELAND: This is a matter to which I have devoted a good deal of attention, and I am extremely glad Mr. Arnold-Forster has come here to bring it before us. I must say that I entirely disagree with what he has put forward. When the question was first mooted, I wondered what was wrong now, because some years ago I for one strongly disapproved of mounting extremely heavy guns on board ship (heavier than were required for the work they had to do), and also of their depending entirely upon hydraulic machinery for their working. That has been altered, I am very glad to say, and I was under the impression that we were now altogether on the right road. When Mr. Arnold-Forster tells us that we are entirely wrong, and that the French are right, it is a very curious thing that the Germans, who are a very shrewd people, are mounting the heavy guns in their four new battle-ships entirely in the same way as we have done, viz., on the double-barrelled system. The Americans, who are also a very shrewd people, are doing exactly the same in the "Indiana," the "Massachusetts," and the "Oregon." I believe in all these ships the guns are mounted in pairs, so that we have two progressive nations, the Germans and the Americans, following our lead. With regard to the French ships I maintain that their mountings are extremely faulty. If you view these questions from a tactical as well as from a structural point of view, you will see in the French ships that their barbettes are open to the same objection as our "Admiral" class, that is to say, if you explode a shell underneath the platform you would unquestionably disable the gun and crew; there is no doubt about it. I would have much preferred if our lecturer had selected our new battle-ships for comparison with the French, because the "Rodney" is nearly open to the same objection as the French ships.[1] The platform of everyone of them is connected with the magazines by an armoured tube, and being totally unprotected beneath is liable to be blown to pieces if a shell should burst under it. I consider that is an extremely undesirable mounting, looking at it from the tactical point of view. Compare our two ships, the "Benbow," with her two 110-ton guns distributed—in separate barbettes—and

[1] There is a possibility of protecting the base of the gun platform in the "Admiral" class with coal, which could not be done in the sponson mountings of the French ships.—H. C.

the "Victoria," with her two 110-ton guns in one turret forward and a 10-in. gun aft; it is worth while to see what the difference is, because they were designed in the same office. You will see that the "Benbow" is nearly 200 tons larger than the "Victoria," draws more water, has a smaller secondary armament, considerably less engine power, and cost more money; and from an offensive point of view, my opinion is that the "Victoria" is a superior vessel to the "Benbow," that is to say, she carries three heavy guns to the "Benbow's" two. She carries those guns with less displacement, she has better engine power and consequently greater speed, and her cost was less. She has also a better secondary armament, carrying two more 6-in. guns and considerably more anti-torpedo-boat guns. From a defensive point of view also, I consider the "Victoria" is a superior vessel, her 110-ton guns being better protected in the turret and with thicker armour, though she does not quite satisfy my views as to what a ship should be; still I look upon her as superior to the "Benbow." It is difficult to criticize the paper at such short notice, but of course the grave question of efficiently mounting heavy guns to reconcile tactical and structural considerations resolves itself into one of *weight*, and is necessarily a compromise. No doubt if you put two guns into two separate mountings it means very much greater weight, and this weight is the great bugbear that we have to deal with. When we have solved the question of mounting in the best way, it is after all only a compromise and must necessarily be so. But I do most thoroughly believe that our Controller's Department, both in the gunnery and constructive branches, has dealt with this question in the best manner, and, as I said before, the Germans and Americans are both following our lead in all their new ships. Even the American ships have their secondary batteries mounted in duplicate. I do not know that I have anything more to comment upon, but it seems to me that the eight points raised by the lecturer are pretty well answered by what I have said. No doubt it might be desirable to carry your guns higher, but it is, as I say, a matter of compromise, and we must be content with carrying them as high as we can reasonably protect them. I, myself, should like to see the barbette forward and the turret aft; but, as that has not been adopted, I suppose there is some structural objection to it. I look upon the mountings of our last two battle-ships, the "Centurion" and the "Barfleur," as a progressive improvement. In these ships I believe we have got over the difficulty, and have combined the advantages of the turret with those of the barbette. Moreover, they are worked by manual labour, and there is no doubt they have ample protection.

Admiral Boys: Mr. Chairman, you have called upon me for some remarks; but I consider myself so *passé* in this subject, that I am bashful in rising to say anything. I agree generally with Admiral Cleveland, especially in his view as to weight. The weight to be carried and economy in construction are the chief considerations of our naval architects in bringing out their designs. There is one point which has not been yet touched upon, a very important one, and which was the origin of the "Monitor" system, namely, the size of the object to be hit. It is quite clear that one target half the size of another would receive but half the number of hits. The low freeboard giving a smaller object to be suddenly seen and aimed at was the main reason, I think, for the introduction of the "Monitor" type of ship, the outcome of which was the double turret system of mounting guns.

Admiral Long: As you have called upon me, I venture to rise; but I confess, only having had this paper on entering the theatre, that I do not feel competent to discuss the matter thoroughly. With regard to the eight points that Mr. Arnold-Forster put forward at the end, I am inclined to think that several of them are practically involved in one; I mean to say, that double-barrelled mounting carries with it the close proximity of the pieces and the casualties and injury to the mechanism. Those I think might practically be taken together. I am not in any way competent to say that nothing better could be done, but I think, as a sailor, there are advantages in having our heavy guns placed in the centre of the ship and at the extremities. I think it gives us better space in the centre for the auxiliary armament, and, perhaps, Mr. Arnold-Forster, who has more acquaintance really with foreign ships than I have, would be kind enough to say whether the arrangement

in the French ships is compatible with as large an amount of auxiliary armament as we have; and that certainly, in the present day, with quick-firing small guns, is a matter of very great importance. With regard to the second point, about being unable to fire at two ships, that is certainly a matter of great importance, but, possibly, it might be looked at in this way: that if you fire two heavy shells at the present day, and hit the ship A, perhaps that ship A might be done for altogether, whereas one shell might not do it. It is possible that that might be so. As a sailor I should certainly prefer to be able to fire in every direction simultaneously, but that may be impossible with the given weight, because we must remember at sea the weight is the great thing. If you give a naval architect any amount of displacement, he can do anything, but as his displacement, as a rule, is limited to a certain amount, and as, in the present day, we have to face not only guns but torpedoes, weight is a very serious matter. For instance, take the question of the "Jauréguiberry;" if that ship were struck by a torpedo on one side, it seems to me, looking at her armament, that she would be at a disadvantage compared with the "Rodney," if she were struck on one side, because she would probably heel over a great deal more. It might be that such a disadvantage would be fatal, or it might not, but there is that to be considered. Mr. Arnold-Forster says it is not essential that guns should be mounted in that manner; that it is possible to distribute four heavy guns in four different positions. I take it that is what he meant. That, I presume, there is no doubt about, but it is a question of displacement; it is a question of multiplying trained individuals who are competent to control the machinery of those four guns. You must remember, you have a trained man who works the mechanism. You, perhaps, have two men, one at each end, to work the mechanism for these four guns. If you had the four guns in different places, you would have to multiply all your people, and that is a matter of some importance. You would also have to multiply the number of the magazines and shell-rooms, which is another matter of great importance, and, although I speak in comparative ignorance (because, of course, all these questions are carefully considered at headquarters before any matter of that kind is decided upon), it is only reasonable to suppose that there are very good reasons for the plans that we have adopted, and on which the value of our ships, of necessity, at this moment, certainly depends to a very great extent. I think we should not forget that. I have the greatest confidence in the ability and care of the Officers to whom these questions are confided, and I do not think it would be right to suppose that they have not been thoroughly sifted to the bottom. Then there is another point, as regards the low freeboard. On that, I can speak with more experience, because I once was in command of the "Agamemnon," and I think what Mr. Arnold-Forster says is correct, that her gun muzzles were really 11 ft. above the water. The edge of the deck was only 8 ft. 6 in. above the water. Of course, when that ship was steaming against a head sea, the sea used to break over the port turret and fly all over the ship. As to firing guns ahead under these circumstances, of course, you frequently could not. That is a matter which has been recognized, certainly, of late, and in the discussions that took place at the Institute of Naval Architects on Mr. W. N. White's paper on the designs of the later programme under which the "Royal Sovereign" and her sisters were built, on April 10, 1889, that question was gone into, and it was perfectly recognized, I think, on the representations of the different Admirals afloat at the time, that a higher freeboard was necessary, and it has been adopted; so that I do not think that question really enters into the present matter. The advantages of a low freeboard were, that you had a much smaller target; and in perfectly smooth water, and under similar circumstances, fighting near land, that probably might be an advantage even now over high freeboard vessels; because from the great amount of unarmoured surface exposed to shell, it is only reasonable to suppose that there would be considerable disadvantage in the high freeboard when the water was perfectly smooth, and when there was no object in steaming fast ahead. But when you come to the Bay of Biscay, and you have to steam ahead against a heavy sea, you must have a high freeboard. The other day, going across the Atlantic in the "Majestic," with a freeboard 28 ft. 6 in., and when there was what they logged as a heavy swell, which I called a moderate one, the water came over the bow when she was steaming 19 knots. I know a naval architect once said to me,

about freeboard, "How are we to tell when we have made it high enough?" That is quite true. I do not believe you ever can make the freeboard high enough to fight guns in *any* weather at sea; it is a question of compromise. I know in a record given in an interesting book upon lighthouses, it is stated that panes of glass have been actually broken by the waves 90 ft. above the mean level of the sea. If that is the case in gales, we must see that the freeboard question is one of degree, and that a vessel of moderate freeboard may be exceedingly useful and a very formidable ship under some circumstances, and those who distribute the ships will have to look out and place them in the right position. They are all useful in their place, I think. No doubt we have done quite right in recognizing the necessity of a higher freeboard. I should be glad if some Officer who has some acquaintance with the technical part of this subject would speak on it. Mr. Arnold-Forster's proposition, broadly stated, is that, "Taken as a whole, the existing arrangements for the mounting and placing of heavy guns in the Royal Navy are faulty and require amendment." As regards the mounting, I must decline saying anything; not being competent to pronounce upon the system of mounting our heavy guns. It is a question of the greatest detail, demanding a most complete acquaintance with mechanical principles and all kinds of inventions. I confess I think it is a great misfortune when guns can only be worked by machinery, but beyond that I do not go. The placing of the heavy guns I consider is not faulty, for this reason: I think they are better placed in the middle of the ship, and as you can only carry a very limited number of heavy guns, I think two at each end a very good arrangement.

Admiral Sir VESEY HAMILTON, K.C.B.: I only received this paper the day before yesterday, and have scarcely had time to look at it, nor am I prepared for discussion. There is a great deal in it which is really a naval architect's question. With regard to the origin of turrets I cannot give any positive opinion, but I think the whole subject was well thought out in former days, and that the turret system was considered superior to the French barbette system of a few years ago. I may illustrate this by referring to the French flag-ship in China, because we in the "Audacious" thought out there that if we could only get that flag-ship within 1,500 yds. we could shut her fire up in a very short time, as her barbette system did not protect the gun's crew as well as ours did. As I have before said, this is a naval architect's question, especially when the question of weight comes in. There is no doubt that placing the two guns in the centre is the better position, and that if we could possibly manage it we ought never to have two guns in one turret; but necessity has compelled us to do it. Mr. White intended to have been present, and he could have told us the price that has to be paid for distributing the guns; because, no doubt, though the French system may offer some advantages over our own, they, on the other hand, have to give up something material that Mr. White could have pointed out to us. Whether our battles will be fought end-on or broadside-on is a problem that the future will have to solve. I give no opinion upon it. The lecturer has practically said that this is a double-barrelled gun, but it does not necessarily follow that you must fire both shots at the same object from a double-barrelled gun. No doubt Mr. Arnold-Forster has often brought down his birds right and left from a double-barrelled gun, and there is no reason why you should not bring down your birds right and left with your turret; there is no reason why you should fire both guns at the same object. In this case one man can fire the double-barrelled gun, but if you have two single-barrelled guns you must have double the number of men to work them. The lecturer says, in speaking of the disadvantages of the double-barrelled system, "Every one knows how conspicuous an object a big gun is on a modern ship, and how little protection is or can be afforded by either barbette or turret." Look at the "Rodney." After all said and done, how very small an object is the gun in comparison with the rest of the ship! That remark put me very much in mind of those American paddle-wheel, beam-engine, slight-built, wooden steamers, altered and fitted specially to ram the "Merrimac." I once observed to an American naval Officer what a large mark the swaybeam would present, and he truly said the mark it presented was comparatively small. So with regard to the gun, the chance that it will be hit is small; it is not an object that will be aimed at; it will only be the chance shot which will hit it. I am sorry

that I have not had more time to get up this subject with regard to modern French ships, with which I confess I am not very well acquainted. With regard to the "Marceau," an eminent naval Officer who visited her was struck with the splendid lower deck, so comfortable a living space for the crew. An eminent naval architect remarked, "You are perfectly right as to that advantage, but you must remember that the ship has not got a water-tight bulkhead on and above the lower deck. That is a very important point, and it shows that the French, in order to get these supposed advantages, have to sacrifice some efficiency. That is only one case I might mention, but I hope some one else will follow who has gone fully into the subject; for instance, some Officer of the "Excellent," who can give an opinion on these points with regard to the chance of anything being hit or of the machinery being disabled, for such an Officer knows the details better than I myself or Admiral Long can possibly know them. The title of this paper is rather misleading. I did not see that it was an attack on principles, thinking it was more one on details of gun-fittings, till I heard it read; and younger Officers could discuss these details better than their seniors. So I for one did not come prepared for a discussion on principles of construction.

Admiral CLEVELAND: May I supplement my remarks with one further observation? It is this. With regard to the French system of mounting their heavy guns in sponsons, there is a grave tactical objection. Though a French gunnery Officer told Mr. Arnold-Forster that the blast of the sponson gun has no effect on the guns before or abaft it if fired near the line of keel, I should have very grave doubts about it unless he had seen it himself. I think myself that the blast of those guns fired ahead or astern would have a very deteriorating effect upon the crews, if not the material, both in the secondary battery, and also in the foremost or after barbette. My experience leads me to infer this.

Commander WELLS, R.N.: There are one or two points that struck me with reference to the lecture that I dare not talk about just yet without full consideration. I think the importance of having the heavy guns amidships has not even been sufficiently dwelt upon by Admiral Long. He dwelt upon the point with reference to the ship being injured and having to heel; but as regards the gun platform, I know the importance in firing the gun, when the ship is all right, and of having your gun amidships with reference to the ship rolling. As regards the upper diagram, the "A" and "B" in the "Rodney," looking at it at first sight, it seems to me the Captain of the "Rodney" has put his enemy in an awkward situation; as a little starboard helm would bring "B" into fire. I also take it that Mr. Arnold-Forster's very able paper has more reference to the action of ship against ship than to the action of fleet against fleet. The tactical question of fleet against fleet has not been at all considered here, and I think the placing of our heavy guns may be ripe for consideration from that point of view. However you set your guns up, you must have some well-organized system of communication. Looking at the gun-deck of that French ship from the bridge, communication with all those little individual forts round the bridge must be something very difficult, and must leave a great deal to the individual action of the Officer, or perhaps to the blue-jacket who is in charge of the gun. The fact that the position of the Captain of the "Victoria" is such that he can look down *on* the principal armament, practically supervise that armament, and use the helm so that it may be best utilized, is a matter which is of considerable weight. The question of the "Victoria" going into action with, say, the "Rodney," is a very material one to be considered. There are many other matters in the paper as to tactical operations upon which I am not prepared to occupy your time, and therefore I will bring my remarks to a close.

Admiral BOYS: May I add one remark? It is with reference to what has been stated, viz., that in the case of one gun in a turret being injured, it necessarily follows that the other one must be in the same predicament. There is one instance that I know of in which that did not happen. The right 38-ton gun in the "Thunderer's" fore turret burst explosively into innumerable pieces, but the left gun in the turret was not disabled in the least, nor was the carriage, and in a very short time that left gun might have been brought into action.

Captain H.S.H. Prince LOUIS OF BATTENBERG, G.C.B.: I think Captain Wells has

robbed me of my only argument. I am, moreover, in the same predicament as the other speakers. I only saw the paper on arriving here, and I am not at all prepared to go into the defects of our system, which, with all due deference to Mr. Arnold-Forster, I consider to be the right one. It is a tactical question. I think our battle-ships are not intended to cruise about singly. In the amusing and clever paper which Mr. Arnold-Forster gave us some time ago, describing the imaginary action between two battle-ships, he was dealing with rather an extreme case, the case of a ship sent out as a reinforcement by herself. I very much doubt whether such a case as that would ever happen. Battle-ships fight in fleets, and their guns and armament are designed for the purpose. I think the diagram which Mr. Arnold-Forster has produced must not be taken literally. Naturally, the ships would not be in that position. The only possible way in which a ship could be going along with a ship on each bow would be in the case of a running fight with two ships showing their sterns towards your bow. In this case, even if you were foolish enough to remain between the two—it would be your own doing—you would have a comparatively light fire against you, because the enemy could not use their bow guns. I do not know whether Mr. Arnold-Forster has been on board the "Victoria," but if he had he would have been immensely surprised at the ease and rapidity with which her enormous turret is swung round. As Sir Vesey Hamilton said just now, it is the case of "right and left;" it is almost a case of swinging your gun round from right to left; but I do not imagine anyone would fight in that extraordinary way. You would take your chance of plugging two shots into "A," and the chance that that would be enough to sink her; and with a touch of the helm you could bring your turret round. I do not agree with the lecturer that the target of a double-barrelled mounting is very much more conspicuous than a single one, for this reason, that they are on the same horizontal plane. With regard to the loading of the two guns, we may take it that they will nearly always be loaded at the same time, and consequently would be in a similar position, and practically, if you take it broadside on, one gun covers the other. If you get them end-on, the target is so infinitesimal that its consideration may be almost dismissed. As regards low freeboard, I was very much struck, when in command of a cruiser in the Mediterranean Fleet, where on one occasion we met the entire French Fleet at sea; I was some distance from our own Fleet, and could see them both from the distance, and the difference in target and in size was perfectly extraordinary. Comparing a ship like the "Trafalgar" with the "Formidable," the one was a hay stack and the other a torpedo-boat. That must have an effect, because nowadays you do not go and shoot at each other at 300 yards. I think Admiral Long hit the nail on the head when he asked where you are to stop. You cannot build a ship 90 ft. high. You are not going to fight a ship in a gale of wind; as a matter of fact, you do not; you wait till the weather clears. I confess I, for one, am not convinced by Mr. Arnold-Forster's most able paper. I should only like to point out what he puts in italics at the commencement: "My proposition, broadly taken, is that, taken as a whole, the existing arrangements for the mounting and placing of heavy guns in the Royal Navy are faulty." It appears to me, unless he and I attach a different meaning to the word "*mounting*," that he has only dealt with the *placing* of the guns. I may be wrong, but on this point I would say I think it is really a mistake to throw the barbette and turret mounting into one pot, because the same arguments do not apply to both. The protection to the gun in the turret is almost complete; the protection to the gun in the barbette is very incomplete, except, there is this to be said, that the men are all below. Mr. Arnold-Forster lays stress on the fact of a direct hit disabling one gun, and, consequently, disabling another gun which happens to be near to it. I think direct hits are those sorts of things which you must run the risk of. They are really in the nature of chance shots. At any rate, it is very much easier to hit the barbette than the turret gun. You may knock a piece off the muzzle of a gun, but what a small target it really is!

Admiral NICHOLSON, C.B.: I should hesitate very much to speak on this occasion, were it not that I wish to point out how entirely I think we must agree with what fell from Prince Louis of Battenberg just now, that, in nineteen cases out of twenty, actions are not fought in heavy weather. It would be one of the worst things we

could do were we to seek to build ships to meet circumstances which seldom occur. I am not very learned in naval history, but I believe it is the fact that hardly any actions have been fought in bad weather. And I feel convinced in my own mind that the battle-grounds of the future will not be in the mid-Atlantic. They are far more likely to be in the Mediterranean, probably at the mouth of the Canal, on the lee side of Malta, or possibly off the great French maritime port of Toulon, or in the Channel. Looking at the size of the ships and their sea-going qualities, I think it would be a great mistake to increase the height of the heavy guns. Of course there is moderation in everything. I do not mean to say that a gun that only has a command of 9 ft. is well placed, but I think it is better placed than one with a command of 25 feet. What fell from the last speaker is extremely practical, namely, that there is nothing that encourages fire so much as having a moderately large target to aim at. The gunners will make better shooting at a vessel like the "Jauréguiberry" than at one of our vessels with a lower freeboard; and if they did that, depend upon it, every shot that hit the ship, although it may not hit any of her extremely vulnerable points, would be a factor in the result of the action. There is another point we ought never to forget when we arm and fight our ships: what every naval Officer desires is to have a good bow fire. I do not think any of us very much care whether we have a powerful stern fire or not; we hope that is not the part of the ship that we shall show to our enemy. What we desire is a powerful bow fire when we attack the enemy. As we pass through them our subsidiary armament will come into play, and I suppose the attacking fleet would then turn and immediately reopen the bow fire, so that, if I had to fight a ship, the first thing I should like to have would be a powerful bow fire. I entirely disagree with the system of placing the guns of the "Jauréguiberry," a ship that I went over frequently while she was building, for the reason given by Admiral Cleveland, namely, that a powerful shell, possibly even a 6-in. shell, bursting under her exposed emplacements would be very likely to raise the whole structure and throw the gun out of action. I am not at all inclined to think the heavy guns are so liable to be damaged by fire as is imagined. In the first place, the surface to be struck is extremely curved; shots will glance off it. There is always such a great amount of uncertainty about a sea action, that I do not think we should find such a target frequently hit, except by a very chance shot. I have not had a previous opportunity of reading the paper, and therefore cannot discuss it further. I only wish to say we are all very much obliged when a gentleman comes before us in this patriotic way and gives us his valuable opinions, and I wish myself I could agree with him more than I do in the conclusions at which he has arrived.

Prince LOUIS OF BATTENBERG: Captain Wells has raised a question which seems to me very important, and it is one upon which I can speak from experience; that is, the difficulty of communicating orders to the guns in the gun positions. In my humble opinion, this is one of the things in which we are very badly off in our modern ships. We have not found any satisfactory means of communicating orders from the conning-tower, or where the Captain happens to be. In the last manœuvres I commanded one of the new 20-knot cruisers, and even there I found it extremely difficult to communicate with the simple armament which we had on board, a 6-inch gun on the forecastle and one on the poop, with a broadside battery, all on the upper deck, so that one could take them all in at one glance almost. If it was difficult under such circumstances, what must it be in a battleship in closed turrets? Voice pipes have failed utterly on board ships. I think this is a very strong practical point, and it is one which, with due deference to the lecturer, would, it strikes me, perhaps not occur to a non-seaman, a man not in the habit of going about in ships and commanding guns. I will only now add that I should like to pay my own personal tribute to Mr. Arnold-Forster and to thank him for giving us this capital lecture.

Mr. LAIRD CLOWES: I had the pleasure of going on board the "Marceau," at Spithead, with Mr. W. H. White and a number of naval Officers, and one of the things Mr. White called our attention to was the complicated system of communication between the magazines and the guns. The "Marceau" has small turrets in sponsons on the broadside and not immediately over the magazines. Each of these turrets involves the adoption of separate provision, first for the transmission of the

projectile and charge by the horizontal method of carriage from the magazine to the bottom of the hoist, and then for the transmission by the vertical method from the bottom of the hoist to the top. One of the results, as we were told, was, that it took considerably longer, upon the ship going to quarters, to load and fire the guns in the "Marceau" than it did, according to our experience, to load and fire heavier guns in large ships of the "Admiral" class. With regard to fighting guns in bad weather, of course the "leading case" of an action fought in a gale of wind is the battle of Quiberon Bay. It would certainly be a great advantage to be able to fight the guns in bad weather, and I believe that it was shown in the manœuvres of 1889, that in steaming against a heavy sea the ships of the "Admiral" class can fire their forward barbette guns. In fact, they did so fire them, for I was in the "Hero" when she was chased by two of them. We could see the forward guns, when in the loading position, struck by a big sea. Immediately afterwards we could see the water pour out of the muzzles like soda-water out of the mouths of two recently opened soda-water bottles; and then followed the discharges. I conclude, as the guns were fired with several degrees of elevation, that there must still have been a good deal of water in them.

Mr. Arnold-Forster: There was no shot in them.

Mr. Laird Clowes: There was certainly no projectile in them. When I saw the title of the paper announced, I hoped that Mr. Arnold-Forster was going to pay some attention to the mounting of our guns. If he had done so, he would, I think, have read a paper of greater practical value. I hoped, too, that he might be going to deal with the question of loading positions. There, no doubt, the modern French ships have a great advantage over all our ships of before a certain date. The guns of modern ships ought to be capable of being loaded in any position. I was on board a little battle-ship the other day belonging to the Argentine Government. Not only could her guns be loaded in any position, but she seemed, I must say, to combine nearly all the features which Mr. Arnold-Forster desires to see in our own ships. There were only two heavy guns, but there you had probably the heaviest possible armament for the small displacement, all well protected so far as protection is obtainable for guns, and each gun independent. I allude to the "Libertad." Mr. Arnold-Forster says that our two guns form practically one double-barrelled gun. According to old theories, and I suppose that we ought to be guided to a certain extent by the past, it was a very great advantage to be able to concentrate your fire. It was generally said that Broke, who had been for many years in command of the "Shannon" before he met the "Chesapeake," had trained his men to concentrate their broadside in such a manner that they could fire every shot of it so as to strike within a few feet of a cask floating at a distance of 400 yards. I imagine that the difference of effect between one shell and two shells, even from the 16·25-in. gun, bursting nearly simultaneously within a limited target area, would be enormous, and might even represent the difference between the partial and total disablement of the hostile ship. Surely, mounting our heavy guns in pairs facilitates the concentration of fire, and is therefore desirable.

Admiral Sir Vesey Hamilton: I should like to make one remark as to what fell from Admiral Nicholson with regard to hitting an object. Sir Lintorn Simmons, a good many years ago, made a calculation with regard to target experiments at Shoeburyness, supposing a square was being fired at. He cut it in half and formed a parallelogram of the same area, and the number of shots that struck the square was greater than that which struck the parallelogram. I cannot tell exactly the proportion, but I remember it was an instance showing the disadvantage of height over length as regards being hit. With regard to the "Admiral" class of turret ships, I believe the question was thoroughly well considered amongst us as to which was the superior plan, and I think the majority of English Officers thought that the low freeboard was the better of the two; and even when we adopted the high freeboard latterly, it was really quite as much on account of the comfort of the men as of anything else. The argument used was also this: "A future war will have to decide as to which is right, the turret or the barbette. If we are right, we have a very great superiority in turret ships; therefore we can now afford to build barbettes and have as many of them as our enemies." That was the convincing

argument with regard to the barbette ships, and also because the high freeboard conduced to the more comfortable living of the crew.

Colonel FRASER, C.B.: I am not a sailor, but, perhaps, I may be allowed to say one word. Within the last few days our lecturer very nearly lost his life in repeated gallant attempts to rescue a friend from drowning. I am sure the meeting will be unanimous in congratulating Mr. Arnold-Forster, that, instead of being under water, he is here to-day to discuss these interesting problems that affect our country so greatly.

Mr. E. RUPERT HICKS: May I, as a civilian, be allowed to ask one question? Would not the "Moncrieff" system get over the trouble which has been referred to? I do not know how many vessels we have in the British Navy that have guns mounted in that manner, but I believe there is one. Would not that system, if adopted (say in the forward turret for example), admit of one gun being raised at a time, and, after that was fired (and, peradventure, missing), of raising the other gun[1] and firing? I am hardly in a position to criticize, but I have listened with great pleasure to the paper, and the discussion. It seems to me, by the adoption of that principle, you get your low freeboard, you hide the men, and you get the full use of the gun, provided it is protected by a suitable turret arrangement. I thank Mr. Arnold-Forster very much for his paper.

Mr. ARNOLD FORSTER (in reply): I wish to explain, before going any further, with reference to my speaking here at all. I have reason to believe I have not interfered with any naval Officer who ought to have spoken here, because our list is not quite complete. I have been several times asked to take part in discussions in this Institution, and, although I have now acceded to the request, I hope you will understand that I am not excluding any naval Officer. I do regret, after having heard all that has been said, that I have not been more thoroughly refuted. I should have welcomed a more decisive refutation of my propositions. I am always the first to admit that, in technical matters connected with professional experience, my opinion is worth nothing at all in comparison with those of Officers; but I do still most respectfully submit that the propositions, or the majority of the propositions, which I have put forward, are matters of logic and matters of common sense, and that they are not exclusively or especially matters of technical detail, and that those propositions that I have put forward have not in any one single instance been met. I have been told—and it is a very reasonable remark—that no doubt a great amount of thought and attention has been given to the construction of our ships, and that does raise a great presumption in favour of the designs which have been adopted being correct; but I cannot conceal from myself the fact that over and over again we have had modifications of a sweeping character in the designs of our battle-ships. We have had modifications in this particular matter of which I am speaking. Within the last few years we have had an absolute revolution with regard to guns, a revolution to which, I believe, Admiral Cleveland would be the first to testify. It is only a very short time ago that the practice of carrying only very heavy guns was adopted as a matter of faith by the Admiralty designers; that practice has been deliberately abandoned as the result of criticisms made upon it. We have had a variety of sweeping changes of that kind, some of which, I am bound to say, have not been suggested in the first instance by members of the Admiralty Board of Construction; and, therefore, though I see the presumptuous nature of the suggestion I make, I do not think it absolutely impossible that other changes may be made in the future which do not emanate from the constructors of our ships. I would also say in my own defence, that I do feel that, when I have behind me the experience of a great Constructive Department, such as that of the French Navy, which in all history has been eminent for skill and success, I am not propounding a proposition which, on the face of it, is either ridiculous or strange. I wonder that Admiral Cleveland did not mention with regard to the German ships, that though it is true that in three ships that the Germans have lately designed the guns are placed in pairs, there are *three* pairs. Of course, if you can double the defensive or offensive power of every turret—do so; but my principle is to distribute the guns; and, of course, if you have three turrets

[1] The above remarks refer, of course, to *two* guns mounted together.—E. R. H.

of two guns each, you are in a much better position than with three distributed turrets with one gun each. With regard to American ships, more than one of the American ships of the latest design have adopted the distributed method instead of the double-barrel method. Admiral Boys mentioned the point of the "Thunderer" gun. That, of course, seems at first a very important analogy in one sense; but the whole circumstances were totally different from the conditions applying to modern breech-loading guns *en barbette*. The loading arrangements of the "Thunderer" were forward of the gun. The gun was muzzle-loading and had to be depressed in order to put the loading gear into the mouth of the gun, and, therefore, there was no reasonable probability that the shock to the gun would dislocate or affect the loading gear. The loading gear of the present gun is in absolute contact with the breech of the gun in various positions, and I do think it is very reasonable to suppose that a blow upon the gun may dislocate the hydraulic loading gear which is at the base of the gun and not at the muzzle. It is said that ships are to fight in fleet actions; but surely that heightens the probability that a ship will be struck on such a vital part as a gun, because the number of discharges from quick-firing guns, especially the new six-inch guns, which will infallibly destroy one of these heavy guns if they strike them, must be enormously increased. With regard to the length of the guns, I would call attention to the fact that the two guns are, in some cases, equal to one-sixth of the whole length of the ship, and, taking the doctrine of chances, the chance that the guns which occupy that space in the length of the ship will be struck in a fleet action is very great indeed, and we cannot afford to neglect it. With regard to the "Marceau," Mr. Clowes had the same experience that I was fortunate enough to have in hearing the opinions of Mr. White (and may I say here that I greatly regret that Mr. White has not been able to be present, but he and I have had many friendly discussions upon this matter, and I know he would once more have convinced me that I was wrong if he had been here); but Mr. White *did* point out to me that the "Marceau" was a most defective ship in many particulars, and I especially called attention to that fact in the remarks I made about the "Marceau" in the lecture. It was pointed out I think by Admiral Long, and also by Prince Louis of Battenberg, that the distribution of the guns made it exceedingly difficult to communicate with the different gun positions. That may be so; I can see the difficulty involved in it; but we are so far neglecting that difficulty that we are putting the whole of the guns of the new battle-ships of the "Royal Sovereign" class into protected and enclosed turrets; and I cannot seriously think that putting two of the heavy guns in addition to what we now have into such protected turrets would add materially to the difficulty of directing guns in action. It has been said that actions will never really be fought in bad weather. I should not presume to express an opinion about that, but what I do say is this, that it is not quite the question of whether actions shall or shall not be fought in bad weather. In old times two fleets used to go out; if the weather were blowing hard they were both equally affected. I do not want a state of things to arise when we may have a French squadron in the Bay of Biscay meeting a British squadron, when it will be fine weather for the French ships and bad weather for the British. But that is a state of things that may easily arise. If you have to drive these low freeboard ironclads at full speed against a heavy sea, it is indisputable that the weather may not be anything like the weather in which the battle of Quiberon Bay was fought; but it may be weather exceedingly trying to a low freeboard ironclad. And though I quite admit, as Mr. Clowes pointed out, that it is possible to work your guns on a low freeboard in a comparatively heavy sea, still it is not possible to work and to sight the guns as they ought to be worked and sighted to give a proper end-on fire. It is said that there is a limit to raising the freeboard. Of course there is; but I do not think it is pretended in the Constructive Department that that limit has been approached in the cases I have criticized. We have, indeed, departed from that system, when after much consideration we built the "Royal Sovereign" class. I admit that you do not want a freeboard as high as the Eddystone Lighthouse, but I think that 23 ft. above the water-line is the limit to which it is proposed to take most of our freeboards. It has been said it is a question of weight and price. There, again, I would submit that these are not deciding elements as against my argument in this

matter. The French ships are all there for our observation and inspection, and though it is perfectly true that the arrangements may be improved on this or that point in the designs of the French ships, still they are there. Weight for weight, they are not heavier than our ships; cost for cost, I think I am correct in saying they do not exceed the cost of our ships. Therefore I think, if we can obtain individual protection for the guns without a larger displacement, and without a cost in excess of that which we already have, that there is an answer, and a good answer, to the very reasonable proposition that we must be guided in this matter by considerations of weight and cost. I do not think the objection as to the number of trained men is one that will be pressed. I believe we should find, if we instituted a proper course of instruction, sufficient trained men—indeed, I think at this moment we could find trained men on every ship to take charge of at least four heavy guns; so that I think that that objection would not be very seriously pressed. Then with regard to placing the gun on the centre line of the ship, a point which has been forcibly alluded to by Captain Wells, I say that it is not necessarily excluded by the plan of distributing your guns, and that on a ship which I still contend is one of the strongest ships afloat, the "Formidable," the plan of keeping the whole of the guns to the centre line is maintained. One Officer said we ought above all things to insist upon having a heavy bow fire. Of course I cordially agree with him, and I should not venture to express my difference of opinion if I did not. But surely it is obvious that in a ship like the "Jauréguiberry," or ships of her class, there must from the very necessity of the case be a more powerful bow fire than in the "Victoria" or the "Rodney," which can only bring two guns to bear forward. I would once more most respectfully call your attention to the propositions which I only regret that I did not at first set out upon the paper. I did not put them upon the paper, because it was only when I came to read my imperfect work again that I realized how incomplete it was, and how much it wanted the finish which I very much desire I could have given to it. But these are the propositions on which I take my stand, and I do say I will put it to the opinion of any impartial person, here or outside, whether any single one of those propositions has been categorically met. We have not been told that it is not a fact that the direction of one gun follows the direction of the other. It may be that is an advantage, but I maintain it is a fact that in the double-barrelled gun one barrel controls the direction of the other.

Admiral Boys: If they are fired simultaneously.

Mr. Arnold-Forster: When one gun is in a position the other gun must be in a similar position at the same time. It was said that it was one object in old warfare to concentrate your broadside; but no concentration of one broadside ever entirely destroyed the fire of the other, and that is a circumstance which I wish to avoid in future on our ships. Certainly my knowledge of such experiments as have been made has confirmed what I have said, namely, that injury to one gun in such close proximity to the other will injure the other. The probability is in that direction, and from what I have seen and read of the effect of the impact of a heavy shell upon such a body as the chase or breech of a 67-ton gun, I think it is exceedingly probable that the very complicated part at the rear of the gun would be injured, even if the chase were not so distorted that no firing could possibly take place from the gun. With regard to casualties liable to occur to the crew, I think it has been admitted that the chance of casualties has been increased. With regard to the larger target it is, of course, obvious to anyone who has seen the French ships in the Mediterranean that they do present a larger target to the eye, but they do not present a larger target in what is important from the point of view of a naval action. The vulnerable part of these ships is not greater than that of our own, and such parts as are vulnerable in our ships are in many cases better protected in the French ships. The broadside accommodation of such ships as the "Amiral Baudin" and the "Formidable" is incomparably better than in some ships of our own Navy, but it is possible that the place in which the men live might be destroyed, and no effect produced on the stability and defensibility of the ship. The mere fact that the ships present a large target is not important if the vulnerable target of the ship be not increased, and I maintain that it is not. I am exceedingly obliged to you for having

so patiently listened to my very imperfect statement. I cannot say that I expected that I should receive anything but unfavourable criticism. I knew perfectly well, in the first place, that there would be the very correct patriotic instinct which would lead Officers to defend our own construction, and I also felt it was exceedingly probable that since much that our naval constructors have been doing has been brought about by the opinions of distinguished Officers, who are here, and who have arrived at their conclusions from the best possible reasons, the Officers in question would maintain their views. But I do hope, and venture to believe, that if due consideration is given to these points, we shall, at any rate, approach this matter with an open mind, and as we are, as I trust, entering upon a large and extended ship-building programme, I hope we shall very carefully study these questions with reference to the position of the guns in our future ships when we undertake this task.

Admiral Sir VESEY HAMILTON: The title of the paper led me to imagine that it dealt more with the technical point than with the general broad principle.

Mr. ARNOLD-FORSTER: I used the word "mounting" in the sense of mounting the gun high or low, and I meant to differentiate the perpendicular from the horizontal position of the guns.

Admiral Sir VESEY HAMILTON: I make apology for myself in not coming better prepared.

The CHAIRMAN (Admiral P. H. Colomb): In rising to offer the thanks of the meeting to the lecturer, it is usual for the Chairman to make some sort of summary of what has been said. I fancy I am more in favour of the lecturer's views than most of the members here present. I do not think that Mr. Arnold-Forster needs in the slightest degree to offer excuses for appearing before us. We have sometimes, I think, found lecturers coming forward for whom excuses were necessary, but those are such as proceed to express views without having really taken very much trouble to form them. Now it is certain from what the lecturer has put forward that he has taken the greatest possible trouble to form correct views, and I think he shows us distinctly that he has an absolute right to the views that he holds, being supported by the two facts that the Navy of late has been full of revolutionary changes, and may expect more of them at any moment, and, secondly, that he has in his favour the views of the French Navy. He puts before us two great principles, the principle that you must separate and isolate your points of attack so to speak, your weapons, and we know that this principle is a guiding principle for naval architects in dealing with secondary armament in most of the new ships. We know also the modern system of fortification runs all in that line, and therefore behind Mr. Arnold-Forster he has that principle, which is a growing one. With regard to our carrying the guns at a greater height, I agree, I think, with some of the speakers that you may very easily overdo it. My own experience as to practice at sea led me to think that gunnery practice from high vantage ground is not so good as from a lower level. I know that, having had very excellent opportunity of comparing it in the "Audacious," where there was a high battery and a low battery. It was a recognized fact on board the ship, and I believe on board all ships of this class, that the practice from the high battery was never as good as the practice from the low battery. Something was due to the arrangements of the ports, but something also it seemed to us was due to the mere height above the water. I think Mr. Arnold-Forster must congratulate himself on the discussion, although at the same time I agree with him to some extent that the points that he laid down were not accurately taken up. But I never knew a discussion in which the points were accurately taken up. What happens in a paper of this sort is that we here discuss it in a rough kind of way; then having discussed it and having heard diverse opinions we read the paper over again, and re-discuss it mentally with all the advantages we have had in this theatre. We then do come to distinct conclusions on the points put forward by the lecturer, although we may not quite form them in the first instance. I agree very strongly, and have for long agreed with the lecturer in objecting to the system which is developed in the "Victoria" of placing the two guns forward. I will not go into all the reasons—I have expressed them often—but I merely say this, that I have never been able to follow the strong

idea which prevails in the navy, and has prevailed for many years, that we are going to fight bow-on. I have never been able to grasp that as a necessary principle. The lecturer has laid some force upon that idea, and there I do not quite go with him. Of the two possibilities, I certainly would say, looking at it from the tactical point of view, that the distribution of one gun forward and another gun aft was much better than the distribution of the two guns forward. In chase it always seems to me that if you have the superiority of speed, the amount of turn which it is necessary to give, in order to bring your whole broadside force to bear, is so comparatively small, that any Captain chasing now under steam would make it. I have experimented thus in one or two ships many times, and I always came to the conclusion that the advantage of getting every gun I could to bear was much greater than the disadvantage of the small amount of turn which it required to bring every gun to bear. Therefore I cannot lay the stress that is laid upon arming a ship specially for bow fire. Admiral Nicholson, I think, said, as a rule, we do not want to turn our stern to the enemy. It has happened in war, and it may happen again in war, that we may have to do it. And then we have seen not only in actual war but in our manœuvres, that a ship, obliged to turn her stern to a superior force, without stern fire is in an exceedingly bad way. Probably she is in a worse way because she cannot afford, with a superior force gaining upon her, to yaw to bring her bow guns to bear, and she is captured practically from want of that stern fire. Numbers of points were raised in the discussion. One was the question of preparing for battle in heavy weather. I think that is a thing you may very easily carry a great deal too far. We have no doubt the case of Quiberon Bay and other actions, where the weather has been heavy, but I suppose one of the reasons why actions have not been usually fought in heavy weather is because it is usually accompanied with a misty atmosphere, and fleets do not see one another so far, and therefore do not meet in that weather. I found myself agreeing more with Prince Louis of Battenberg in the practical views expressed than most of the speakers, but I found myself also a great deal in agreement with Admiral Nicholson. Although I do not agree with him about the bow fire, still I do as regards bad weather. I think we have had, as I say, a useful discussion, but the most useful discussion is yet to come. I am sure we thank Mr. Arnold-Forster heartily for having come here, and we hope he will come again.

OCCASIONAL PAPERS.

FOREIGN WAR OFFICES.

By Captain C. E. Callwell, R.A.

A point which at once arrests attention, when foreign War Office systems are considered and compared with ours, is, that abroad the War Minister is almost always a soldier, and of high rank. The peculiarities of our constitutional arrangements render it almost impossible for the portfolio of war to be entrusted to a military man. A seat in the House of Commons could not always be found for a General Officer competent and willing to assume the responsibilities of a Secretaryship of State. Quite apart from the inconveniences inseparable from the head of a great spending department being in the Upper House, soldiers are not generally in a position to accept the peerage which would give them the necessary qualifications for joining the cabinet. A Minister of the Crown must, with us, be a member of one or other Chamber, and this constitutional restriction places the supreme control of the administration of the British Army almost of necessity in civilian hands.

In foreign constitutionally governed countries, the War Minister has generally the right, in virtue of his office, to attend the sittings of Parliament whether he has or has not a seat, at least when subjects dealt with by his department of the executive are under discussion. The practice varies somewhat in different countries, but the principle holds in nearly all. For instance, in France, Spain, Belgium, and the Netherlands, he has the right of entry into both Chambers and can speak, but only has a vote in one Chamber, and that only if he happen to be a member. In Italy, General Officers are especially, under the terms of the constitution, included in the category of persons who can be appointed Senators by the Sovereign; in Spain, General Officers and Admirals of the highest ranks are Senators in their own right. But the ordinary procedure abroad is that a General Officer is nominated War Minister, which gives him the right to take part in all debates on military questions, and to bring in and defend the details of the military budget in the Representative Chamber, which, as a rule, alone deals with financial matters.

The present Italian War Minister happens to be a member of the Chamber of Deputies; but, as a rule, if not a Senator or Member of the Upper House, a foreign War Minister is not a Member of Parliament. He is free from the worries and trammels of party politics. Indeed, in those countries where the lives of cabinets are not very prolonged, he not unfrequently survives a change of Government. This has occurred recently in both Italy and France.

Into the advantages and disadvantages of creating soldiers Ministers of War it is not proposed to enter. But it may be pointed out that it sometimes happens, even in countries where no constitutional impediment exists to the appointment of distinguished Officers, that civilians are nominated to the post. M. Gambetta, M. Freycinet, and M. Tricoupis are examples of this. And it will hardly be said that these gentlemen have been among the least successful of those who have held the reins of office in their respective countries.

The position and powers of War Ministers vary considerably in different foreign States. In France, the head of the War Office is really supreme on all points with regard to the Army, although the President of the Republic nominally is at its head; all except the very highest appointments are in his hands, and the entire military forces of the country are completely under his control. In no other continental country has the War Minister a position so responsible, for the Sovereign generally exercises his authority as Commander-in-Chief to a considerable extent in the matter of appointments and command. In Austria-Hungary, where the whole constitutional system is greatly complicated by the dual form of Government, the War Minister, who is one of the three Ministers who form the central executive of the Empire and are responsible to the delegations representing both monarchies, administers the regular forces and also the Navy; and there are Austrian and Hungarian "Ministers of Defence," who deal with the respective auxiliary forces of the two monarchies, and are responsible to their Parliaments. In considering the central administration of the Austro-Hungarian Army in comparison with that of this and of other foreign countries, it is, however, convenient to consider the War Minister and the War Office alone, and not to notice the two separate "Defence Ministries." As a matter of fact, these "Defence Ministries" are completely dominated by the War Office; but their existence pleases the representatives of the people. The Austro-Hungarian and Italian War Ministers are, as regards their responsibilities, in a very analogous position; the Sovereign, being Commander-in-Chief, has a considerable share in the control of military matters; the Minister is responsible to Parliament (the delegations in Austria-Hungary) on questions of expenditure, and issues orders in the name of the Sovereign on all subjects. The position of the War Minister in most other European monarchies—Belgium, Spain, Portugal, Roumania, Denmark, &c.—is similar. In autocratic Russia the Minister is the chief military administrative authority under the Tsar, to whom alone he is responsible on financial and other questions; he has all military authorities under his orders.

The German system is peculiar. The German Empire includes Bavaria, Würtemberg, and Saxony, which are quite independent of the Prussian War Office; but, to a certain extent, Prussia, as head of the Confederation and foremost State of the Empire, dominates the whole German Army. The Prussian War Minister has no control over Bavaria, Würtemberg, and Saxony, which have their own Ministers. His authority over the Prussian Army is by no means so

comprehensive as that of the French or Italian War Ministers. His responsibilities embrace the financial consideration of questions as to establishments, &c., and the control of the administrative and financial branches, and, to a certain extent, of the medical service. He is charged with the supply of war material, food, clothing, remounts, &c., and with the presentation of estimates to Parliament. With the combatant services he deals only as regards supply and pay. He is under the Emperor as Commander-in-Chief, and has co-equal with him, the Chief of the Military Cabinet and the Chief of the General Staff. In other foreign countries the Chief of the General Staff and the official or officials dealing with the duties that are in Prussia performed by the Chief of the Military Cabinet, are under the War Minister, and not, to all intents and purposes, independent of him. The position of Minister of War in Prussia has really much resemblance to that of the Military Member of Council in India.

It should be noted that in Austria-Hungary there is, at present, an Inspector-General of the Army responsible to the Sovereign alone. This somewhat anomalous post has been created for the Archduke Albrecht, and it will not, most probably, survive that most distinguished soldier.

Abroad, the War Minister is generally the only representative of the central administration of the Army, with an official position as regards the legislature. There is no constitutional reason, as in this country, for a subordinate Minister, for the War Minister can attend either Chamber when military matters are in debate or are the subject of enquiry. Not only is no official analogous to our Parliamentary Under-Secretary of State to be found in foreign countries, but a functionary such as our Financial Secretary is absolutely unknown. The supreme control of the financial side of foreign War Offices is generally vested in the head of one department of the office, who is a permanent official and not a politician, and who has graduated in the financial branches of the Army and has a military status. But heads of Departments are not unfrequently found with seats in the Upper House abroad. Several high War Office officials are members of the Federal Council of the German Empire. The Chief of the General Staff in Italy is a Senator owing to his high rank.

The placing of the Navy under the War Minister, as in Austria-Hungary, is unusual. The Roumanian and Bulgarian flotillas are under the War Offices of those countries, but they comprise only a few small vessels.

A very important feature in many foreign countries is the existence of a superior military council, and, before proceeding to examine the distribution of work within the War Offices of the more important continental Powers, a few details as to these councils may be given with advantage. In some cases they consist simply of heads of War Office Departments; in others they are formed of Officers who have no connection with the Central Administration; in others, again, they are composed partly of officials and partly of outsiders specially nominated. The last is the system adopted in France, where the

functions of the Superior War Council, as it is called, are clearly laid down by decree, and its composition definitely fixed. It comprises the Chief of the General Staff and certain other *ex officio* members, together with eight General Officers appointed by name, including those with letters of service nominating them to the command of armies on mobilization. The War Minister presides, but the President of the Republic may call the Council together, and, in such case, the Premier and Minister of Marine join in the deliberations. Important questions of military policy are submitted to it, and it enables the Generals, who will in the event of war hold high command, to give their opinions on any great projects of reform, &c., which may be formulated by the War Office; the War Minister is bound to consult it on certain matters, but he is not obliged to abide by its advice. In Belgium and in Roumania there are similar mixed councils, consisting partly of War Office officials and partly of General Officers specially appointed. In Germany, the "Defence Committee," which meets only by order of the Emperor, consists partly of officials of the Central Administration, including the Chief of the General Staff, and partly of General Officers and representatives of the Navy specially appointed. But the President is a General Officer of highest rank, and the post was held by the late Emperor Frederick when Crown Prince, and by Count Von Moltke after his retirement from the control of the General Staff.

In Denmark the War Office Council consists of War Office officials alone. In Russia, on the other hand, there is a "Supreme Military Council" which consists entirely of General Officers, who are not only unconnected with the Central Administration, but also hold no commands, and which is under the presidency of the War Minister; this Council has extended powers, for its decisions must be accepted by the Minister, subject to the approval of the Tsar. In Spain, the Superior Military Council is, as in Russia, composed of non-official members. Neither in Austria-Hungary nor in Italy are there regularly constituted councils whose duty it is to consider and give their opinion upon broad principles of military policy; but it is the practice of the Sovereign to call together the Commanders of Army Corps from time to time, and to deliberate with them and the War Minister and Chief of the General Staff on matters of importance.

The position of the Chief of the General Staff in foreign armies is of especial interest to military men in this country, owing to the recommendations made by Lord Hartington's Commission as to the creation of the office of Chief of the Staff in our War Office. Before going further, it may at once be pointed out that it is quite incorrect to describe this official, as he exists abroad, as the Chief of the Staff. He is Chief of the General Staff, not Chief of the Staff. The idea conveyed by the title, "Chief of the Staff," is that of the principal Staff Officer of some superior, who issues orders in the name of that superior to all who are under the superior's authority. This is, in fact, the position of the Chief of the Staff in time of war in our Army, and it is the position which, as a rule, the Chief of the General Staff abroad assumes on the issue of orders for mobilization. But in time

of peace the power of the Chief of the General Staff to issue orders is generally very restricted in foreign countries. In those countries where he is an executive head of a War Office department he is not superior to the heads of the other departments in any way. His title is derived from his relations with a particular branch of the Army, the General Staff, not from his position as regards the other officers and officials forming the Staff of the Central Administration. In the majority of foreign countries he is mainly in a consultative position, and cannot issue orders at all, except under limitations and to certain special services. There is in this country a fairly clear distinction between Staff and General Staff; but since the reorganization of the Army Service Corps, General Staff with us has become a more comprehensive term than *Generalstab* in Germany and Austria-Hungary, or *État Major de l'Armée* in France, which exactly represent what was covered by our General Staff before it came to include intendance.

Every European country, except Spain, Switzerland, Montenegro, and the United Kingdom, has a Chief of the General Staff. Although the position of this official considerably varies in different armies, there are certain duties almost always confided to his charge. He is responsible for the preparation of plans for possible campaigns. To him are confided the study of the strategical conditions of his own and foreign countries, and the elaboration of schemes of mobilization and concentration. He is charged with the superintendence of intelligence work and with the control of General Staff training. He has generally the management of survey and topographical work, and exercises special superintendence over the railway and telegraph troops. In Germany, the Chief of the General Staff (Prussian) holds quite an exceptional position, being responsible to the Emperor alone, and on a footing of equality with the War Minister; the Central Department under his immediate control is the celebrated Great General Staff; his position is almost entirely consultative; except as regards the Great General Staff, the survey, the railway and telegraph troops, and some minor matters, he has no executive authority. In Russia, the Chief of the General Staff is not only charged with the duties described above as those generally performed by the official bearing this title, but also practically with all the duties performed in our War Office by the Adjutant-General's and Military Secretary's Departments; he is head of one great branch of the War Office, and is under the War Minister; he acts, of course, both in an executive and a consultative capacity, and in the comprehensive character of his functions has no prototype in any other foreign War Office.

In France, the Chief of the General Staff is head of one department of the War Office, and stands on exactly the same footing as other heads of departments, *e.g.*, the Director of Artillery, except in that he is *ex officio* member of the Superior Military Council. One division of his department deals with the dislocation of the Army, with the position and organization of the magazines of stores prepared for war, with the issue of orders as to arrangements for mobilization, &c. Another division deals with communications in general, with railways, and with the transport of troops. In addition, there are the divisions

dealing with intelligence work, and with the drawing up of topographical reports and historical works. Under the control of the Chief of the General Staff is also the geographical and survey service. The department is an executive department, with power to issue orders on many subjects to Army Corps Commanders, in addition to performing the mere consultative functions of drawing up schemes for campaigns, studying foreign armies and foreign theatres of war, and so forth. The position of the Chiefs of the General Staff in Roumania and in Greece is very similar to what it is in France. But in most foreign countries —Austria-Hungary, Italy, Bulgaria, Denmark, Portugal, &c.—the Chief of the General Staff, although under the War Minister, is in a consultative position outside the War Office proper. In these countries, executive work in connection with mobilization, movement of troops, &c., is carried out by special branches or sections of the War Office.

The British War Office consists, in the first place, of (1) a Central Office, (2) a Military Department, and (3) a Civil Department. The Central Office deals with registry and record of correspondence; it is in fact the chancery, and this is found, in some form or other, in all foreign War Offices. But the broad division into a military and a civil side is not to be found abroad. The civil side in Pall Mall comprises a financial branch, a contracts branch, and a branch in charge of manufacturing establishments. In foreign countries there is generally a distinct financial branch, forming a War Office Department; but the responsibility for contracts and for Government factories rests with the departments that deal with warlike stores, with works, and with clothing.

All foreign War Offices are split up into several departments or sections. In France there are ten departments and a chancery. In Italy there are six departments, besides a central branch, which includes a chancery and several sections dealing with a variety of subjects. In Russia there are eight departments. In the Prussian War Office there are seven departments. The Austro-Hungarian War Office comprises a chancery, a special branch, and fifteen sections, besides a Naval Department; the special branch and the fifteen sections are grouped together into five departments, but the tendency of the somewhat voluminous regulations on the subject is to make the head of the section, and not the head of the department, the really responsible official. The War Minister is, in all these countries, the central authority dealing directly with the heads of departments. In Italy there is a General Officer as Under-Secretary of State at the head of the central branch, who acts as deputy of the War Minister in his absence, but who otherwise has no control over heads of departments. There is an Under-Secretary in Spain, in a very analogous position.

Our Military Secretary's Division deals mainly with the appointment, promotion, and retirement of Officers, and with questions of reward. In Germany these matters rest (except as regards the General Staff, which in all foreign countries is under the Chief of the General Staff, where one exists) with the Chief of the Military

Cabinet, who is not under the War Minister. In Russia these questions are dealt with by certain sections under the Chief of the General Staff, as already stated. In Austria-Hungary they are dealt with by the special branch and one section. In Belgium and in Portugal one section is charged with these duties, and in Spain the work is divided between two sections. But in France and in Italy all questions as to Officers are dealt with in the department concerned with that branch of the service to which the Officers belong; for instance, all arrangements as to artillery Officers are carried out in the Artillery Department.

For our Adjutant-General's Division, comprising as it does the control of recruiting, of questions as to establishments, of discipline, of training and drill, of auxiliary forces, of artillery and engineer Officers, and of mobilization and home defence, there is no equivalent to be found in any continental War Office, except in the department of the Chief of the General Staff in Russia. It must be remembered that the decentralization, which is the keynote of foreign military organization, tends to relieve War Offices abroad of much detail that is gone into in the Adjutant-General's Office in Pall Mall. In Germany these duties are really carried out by Army Corps Commanders, and as regards mobilization by the Great General Staff. In France the duties are distributed between the department of the Chief of the General Staff and the Infantry, Cavalry, Artillery, and Engineer Departments; each of these latter is responsible for everything as regards its own arm, except recruiting, which is especially made a function of the Infantry Department, and discipline, which comes under one section of the Cavalry Department; the auxiliary forces in France are especially placed under the Infantry Department. In Italy executive work, as regards mobilization, is carried out by one division of the Central Branch; otherwise the system is much as in France. But one department especially deals with recruiting, posting, establishments, &c., of non-commissioned officers and men of both Regulars and Reserve forces. In Austria-Hungary the duties performed by our Adjutant-General's Division are spread over six of the fifteen sections. It is generally the case abroad, as in France, that one section of some department deals with discipline. There is generally also a kind of Court of Appeal with power to revise and quash sentences, with a position comparing more or less with our Judge Advocate-General's Department. In Spain one such court suffices for both the military and naval forces, although these are administratively quite distinct. With us the Inspector-General of Cavalry is under the Adjutant-General's Division, but abroad Inspectors-General are as a rule quite independent of War Office departments, reporting direct to the Sovereign or else to the War Minister.

The Quartermaster-General in this country is charged with supplying the army with food, forage, fuel and light, quarters, transport, and remounts, with the movement of troops, with the distribution of their stores and equipment, and with the administration of the Army Service Corps. Here, again, there is very great difficulty in estab-

lishing comparisons with continental systems. As a rule the train is a totally distinct branch abroad from the commissariat service; in Italy, indeed, it forms part of the artillery. Abroad the supply of food, forage, fuel and light, clothing, and equipment is generally under one department; and this generally deals also with the pay of troops. The Quartermaster-General's Division being one of our great spending departments, its principal duties are necessarily performed in branches of the War Office in Prussia; the "Economy Department" of the Prussian War Office deals with food, forage, and quarters, and also with the pay service, with finance in general, with audit of accounts, and with the supply of clothing and equipment. The supply of clothing is with us, it must be remembered, under the civil side. In France, in Italy, and in Russia the supply of food, forage, and clothing, and also the pay service, are under one department, and in Austria-Hungary under sections grouped in one department. There is a special remounts branch in the Prussian War Office; in France there is a remounts section in the Cavalry Department, and in Italy in the joint Cavalry and Infantry Department; in Austria-Hungary the Cavalry Section deals with remounts. The transport service is abroad generally either under the Cavalry or Artillery Department, being a combatant service. In the Prussian and Italian War Offices the quartering of troops comes under the same branch as the supply of food, clothing, &c., but in France it is superintended by the Engineer Department. In France the transport of troops is under the Chief of the General Staff, and in Austria-Hungary and Italy under the executive sections of the War Office dealing with General Staff questions; in the Prussian War Office there is one especial section concerned with the transport of troops.

The Department of our Director of Artillery admits of more ready comparison with foreign systems. Every continental War Office may be said to have one branch charged with the supply, storage, and manufacture of armament and ammunition; but France is peculiar in that the supply, &c., of powder is under a distinct branch independent of the Artillery Department. The system abroad, however, differs from that in this country in that the arsenals and factories are under the Artillery Department, while with us they are under the civil side. Moreover, all contracts for war material and ordnance stores are arranged for by the Artillery Department in foreign War Offices. Except in the Prussian War Office, it is very generally the case that the Artillery Department is responsible for the personnel and technical education of the artillery arm. In France the Director of Artillery is responsible for everything except recruiting; in Italy for everything except the personnel and establishments of non-commissioned officers and men. In Russia and Austria-Hungary the Artillery Department deals with training and organization generally, but not with personnel. There are, as a rule, consultative committees, similar to our Ordnance Committee, charged with carrying out experiments, &c., and watching the progress of technical science.

Abroad, an Engineer Department, somewhat analogous to our Inspector-General of Fortifications and Royal Engineers' Division,

almost invariably exists. The Engineer Department is in each case on the same lines as the corresponding Artillery Department. Thus, in France, the Director of Engineers is responsible for everything as regards fortifications and the engineer service except its recruiting. It must be remembered that the practice is for railway and telegraph troops and balloon establishments to be under the Chief of the General Staff.

The Intelligence, Topographical and Map-making Services, combined in the Intelligence Division of our War Office, do not as a rule form part of foreign War Offices, being under the Chief of the General Staff. In Belgium, however, they are not under the Chief of the General Staff, who is merely responsible for maintaining a general superintendence over the General Staff as a branch of the service, but form part of the War Office. In France, Russia, Roumania, and Greece, they, with the Chief of the General Staff's Department, belong to the War Office; but in Prussia, Austria-Hungary, Italy, and most other continental countries, they are outside of it. One important point is that abroad the survey of the country, which with us is under the Board of Agriculture, is under the Chief of the General Staff. Map-making of remote and partially explored territories, which forms such a large part of the work of our Intelligence Division, is, owing to the greater compactness of continental countries and their possessions, a less important work to them, and they trust largely to civilian geographers for maps of countries not on their immediate borders. In France one division of the department of the Chief of the General Staff is especially charged with the study of the theory of war and with compiling works thereon; abroad such works are generally prepared in the Chief of the General Staff's Department; in our War Office no branch is made responsible for this duty. Nor is any branch of our War Office charged with the compilation of historical works and records of campaigns, although such books actually are generally prepared in the Intelligence Division; France, Germany, and Austria-Hungary have special historical sections, but such do not appear to exist in Italy or Russia.

The duties of our Director-General of Military Education are generally in foreign countries confided to several departments. Institutions similar to our Staff College are almost invariably under the Chief of the General Staff. Technical education of artillery and engineers is, as a rule, under the Artillery and Engineer Departments. The education of non-commissioned officers and men of different arms falls in most countries under the departments dealing with the personnel of those arms.

Most foreign War Offices have a department very similar to that of our Director-General of the Medical Department, with the control of medical personnel and of hospitals. This generally has charge of the supply of medical stores and of drawing up all medical regulations. It is, moreover, as a rule, entirely responsible for the technical education and instruction of the medical service.

Coming to the question of the financial department of the War

Office, which with us forms the most important part of the civil side, there is a clearly marked distinction between the system obtaining in this country and that generally adopted abroad. In foreign countries the arrangement and responsibility for pay of troops rest as a rule with the same department as deals with the supply of food, clothing, &c. The central financial department of the War Office is concerned only with the examination and general audit of accounts from other departments, with the compilation of the estimates in bulk from the estimates sent in by other departments, and with the control of certain special funds. In France, what may be called the central financial branch is under the Director of Control, an official belonging to the control service of the army, the personnel of which is wholly under the Director. This control service is an institution of somewhat recent creation, which is intended mainly to safeguard the interests of the Treasury; those officials of the service who do not belong to the Central Administration have no executive functions, they merely report to the Director the result of their inspections. Besides superintending the operations of the controllers, the department of the Director of Control is charged with the preparation of the budget, with the examination from the financial point of view of every administrative measure that may create supplementary or unusual expenditure, with general audit of accounts, and with correspondence with the Ministry of Finance. The pay and allowances of troops are in France administered under the department of the Director of Administrative Services—that which deals with the supply of food, clothing, equipment, &c. In the Prussian War Office, on the other hand, the financial branch, which forms one section of the "Economy Department," deals also with pay and allowances. In Italy there is a financial division in the Central Branch, and this deals with compilation of estimates, liquidation of expenditure, general audit, &c.; but, as in France, pay and allowances come under the department for administrative services. In Austria-Hungary one section deals with preparation of estimates and another with pay and allowances. It must be remembered that the usual system abroad is for spending departments to have whatever sums they estimate for placed at their disposal—provided of course these are approved by Parliament—and they then become responsible for the expenditure.

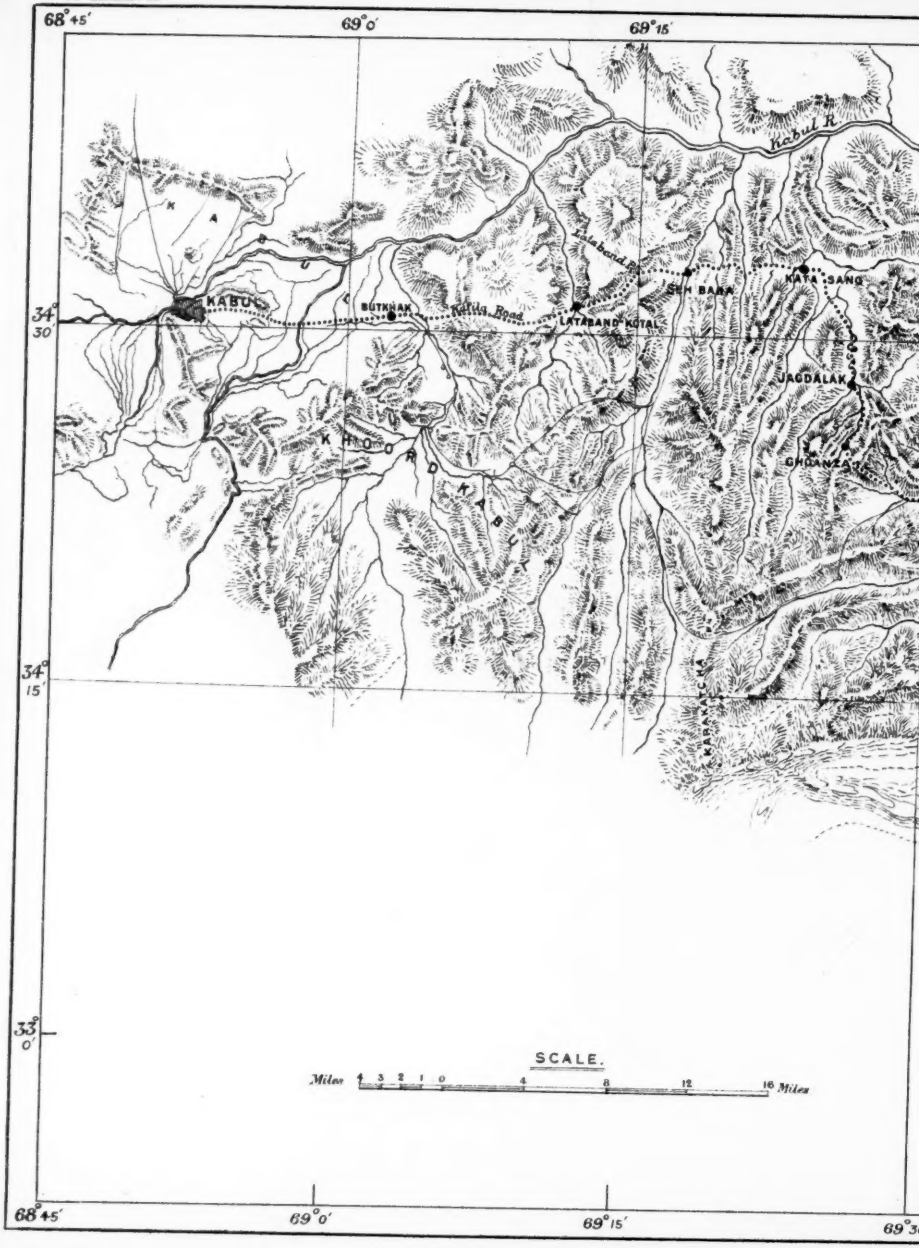
The system of maintaining special departments for dealing with contracts in general, and for superintending government factories, is peculiar to this country. As has been already pointed out, the control of these services rests with those departments which from their nature have to obtain stores, &c., by contract or else by manufacturing them.

Permanent consultative committees analogous to our Ordnance Committee are very general abroad, as auxiliaries to the various War Offices. In France there is such a committee for each arm of the service. These committees assist the heads of War Office departments. In some countries the artillery and engineer committees are especially charged with the duty of noting changes, discoveries, &c.,

as regards their arms in foreign countries; they act in fact as intelligence departments on technical subjects; this is the case in Austria-Hungary. In Italy committees have lately been replaced by Inspectors-General of the different arms with subordinates under them. In most foreign countries there are Inspectors-General outside the War Office who report on the different branches of the service to the War Minister, and in some cases to the Sovereign. In Prussia the Inspectors-General of Foot Artillery, of Engineers, Pioneers, and Fortresses, of Military Education, and of Rifles and Sharpshooters, report direct to the Emperor, and possess moreover certain executive powers.

From the above notes as to the distribution of work in foreign War Offices, it is obvious that there is much variety in the systems that are in vogue. Regarding these different systems from the British point of view, those obtaining in France and Italy seem of greatest interest. The Russian and Prussian systems are wholly incompatible with the British Constitution. The Austro-Hungarian War Office cannot, owing to the peculiar relations existing between heads of departments and heads of sections forming part of the departments, be taken as a model of a sound organization with a well-established chain of responsibility. The central administrations of the military forces of the German and Austro-Hungarian Empires are moreover complicated, owing to special arrangements arising from the fact that these Powers represent federations and not homogeneous monarchies. Yet in certain respects continental War Office systems are all alike.

In no foreign War Office does an official in the position of a Master-General or Surveyor-General, a post which some writers on our central military administration seem desirous of creating, exist; the Intendance Department, Artillery Department, and Engineer Department—the three branches dealing with supply which would be placed under such an official—are almost invariably perfectly distinct. In no foreign War Office is the head of the financial branch or of any other branch a politician whose tenure of office terminates in the event of a change of Government. No foreign War Office is split into two camps—a military side and a civil side.


68°45′
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34° 30
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Kabul R.
KABUL
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GHUNZAO
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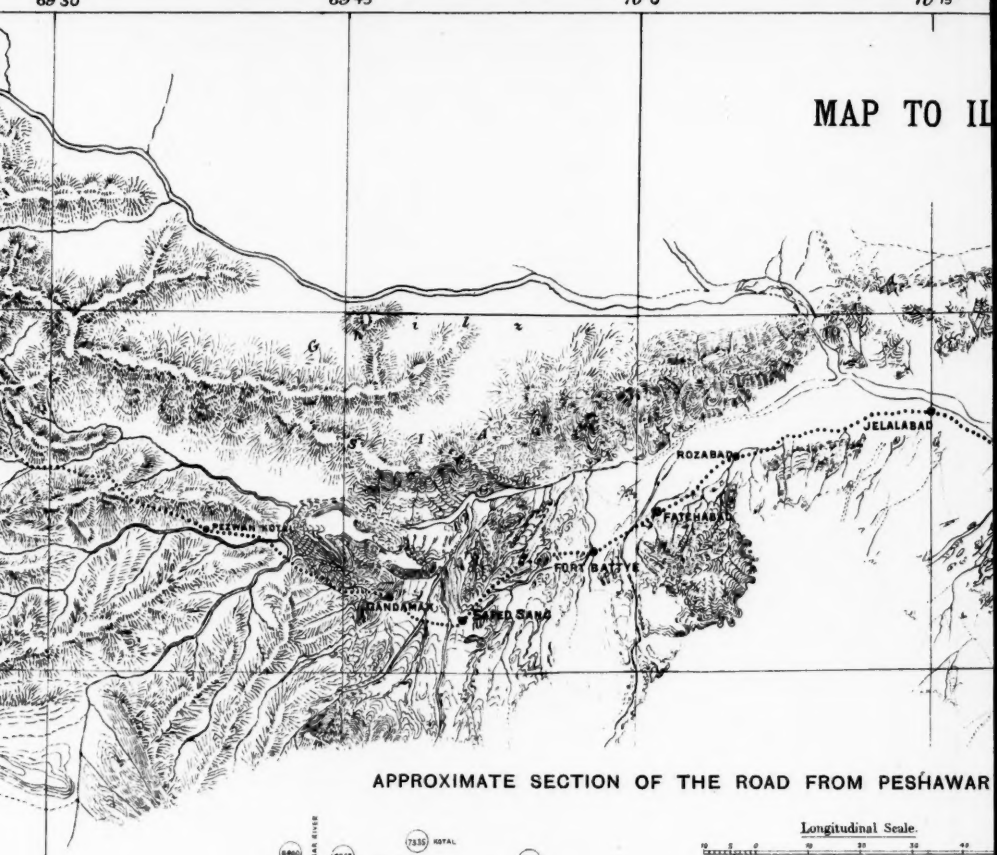
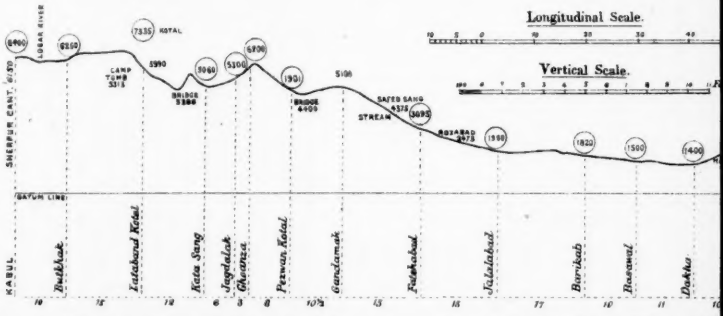
69°30′ 69°45′ 70°0′ 70°15′

MAP TO IL



APPROXIMATE SECTION OF THE ROAD FROM PESHAWAR



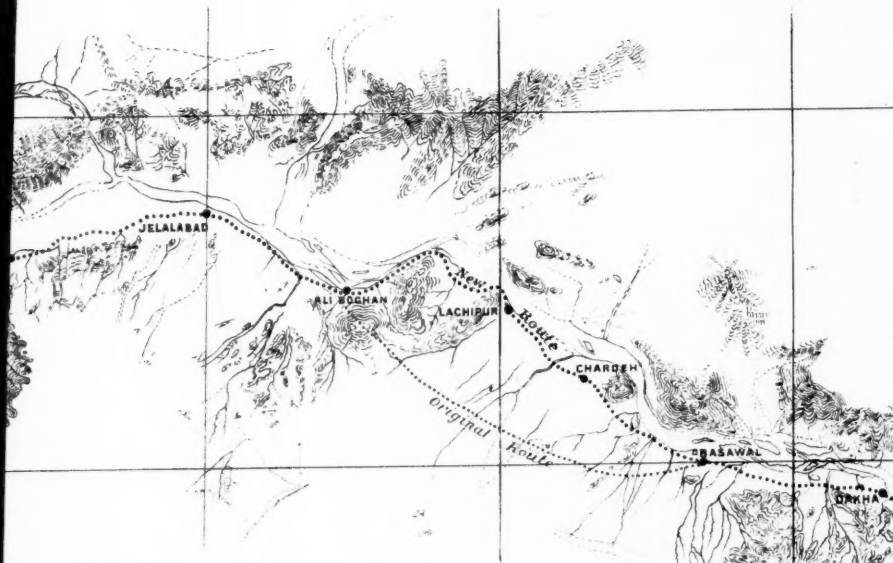
The portion of the Route between Jalalabad and Basawal was altered in April, 1879. The road fo
River, the stages being Ali Boghan, Chardeh, Lachipur and Basawa

69°30 69°45′ 70°0′ 70°15′

Harrison & Sons, Lith. St Martins Lane W.C.

70°15′ 70°30′ 70°45′

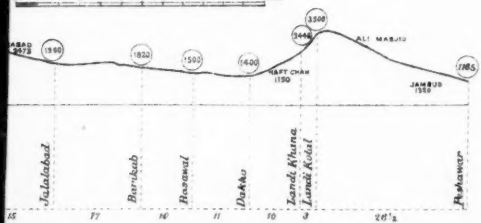
MAP TO ILLUSTRATE GENERAL SIR D. STEWART



ROAD FROM PESHAWAR TO KABUL.

Longitudinal Scale.

Vertical Scale.



ered in April, 1879. The road followed the Course of the Kabul
, Chardeh, Lachipur and Basawal.

70°15′ 70°30′ 70°45′

d. St Martins Lane W.C

80°45′
80°0′
80°15′
EWART'S MARCH.
34° 30′
34° 15′
33° 0′
DAKHA
LAND KHANA
JAMRUD
HARI SING BUAJ
PESHAWAR
80°45′
80°0′
80°15′

BRIEF ACCOUNT OF THE RETURN MARCH TO INDIA OF THE ARMY IN AFGHANISTAN, UNDER GENERAL SIR DONALD STEWART, G.C.B., &c., IN 1880.

By Lieutenant-Colonel WALTER J. BOYES, late D.A.A.G., N. Afghanistan Field Force.

THE return march of the Army from Afghanistan to India under General Sir Donald Stewart, G.C.B., in 1880, though unmarked by stirring events, is one of the most interesting features connected with the history of the Afghan Campaign. The task was a difficult one, and its successful achievement, whether on military, political, or any other grounds, far exceeded the most sanguine expectations.

But before entering into detail as to the arrangements for withdrawal, a brief description of the country to be traversed will not be out of place.

The route may be divided into three distinct portions, viz. :—

1. From Kabul to Jellalabad.
2. From Jellalabad to Dakha.
3. From Dakha to Peshawar.

The first, about 94 miles long, led over mountain passes and through narrow, rocky defiles, including the Lataband Kotal, and the ever memorable "Pari Darra" and "Jagdallak" defiles.

The second, about 38 miles, follows generally the course of the Kabul River through a more or less open, stony valley, intersected by rocky nullahs and low, rugged hills.

The third, about 40 miles, winds for a distance of about 30 miles through the historic "Khyber Pass," when it debouches into the Peshawar Valley at the fort of Jamrud (distant about 9 miles from Peshawar).

With the exception of some few fertile spots in the vicinity of streams or "Karez," the route throughout is a rugged, treeless, waterless waste.

The total distance from Kabul to Peshawar is, roughly speaking, about 170 miles. Posts[1] had been established along the whole way, with large Depôts and General Hospitals at Dakha, Jellalabad, and Safed Sang. "Movable columns" had also been formed at important places in the vicinity of the road, to guard against sudden raids.

Shortly before the date fixed for withdrawal, all traffic from India had been reduced to actual requirements. The sick had been elimi-

[1] 1. Butkhak. 2. Lataband. 3. Seh Baba. 4. Jagdallak. 5. Pezwan. 6. Safed Sang. 7. Fort Battye. 8. Rozabad. 9. Jellalabad. 10. Ali Boghar. 11. Lachipur. 12. Chardeh. 13. Basawal. 14. Dakha. 15. Landi Khana. 16. Kata Kushtia. 17. Jamrud. 18. Peshawar.

nated and sent off with surplus stores to India, and arrangements had been made for moving out of Kabul by three separate columns, viz.:—1st, under Sir Frederick Roberts, *viâ* the Logar Valley and Shutargurdan Pass to Kuram; 2nd, under Major-General J. J. Ross, C.B., *viâ* the Kurd Kabul Pass and the Hissarak Valley to Pesh Bolak, thence to fit into the regular route at Dakha; 3rd (with Army Headquarters), under Major-General J. J. Hills, V.C., C.B., by the regular road, *viâ* the Lataband Pass, Jellalabad, and Dakha.

Whilst these preparations were in progress news was received in Kabul, on July 28, of the disastrous defeat of Brigadier-General Burrows at Maiwand, and the withdrawal within the city of the troops at Kandahar.

The Government of India, in consultation with General Sir Donald Stewart, decided on despatching at once from Kabul a lightly equipped picked force for the relief of the beleaguered garrison in Kandahar. Sir Donald Stewart delegated the command of this force to General Sir Frederick Roberts, whilst he himself undertook the more difficult task of conducting the withdrawal of the troops to India.

The brilliant success of the Kandahar Column[1] needs no comment here, except to illustrate more forcibly the difficulties which attended the simultaneous march to India.

The Kandahar Force was composed of men selected from troops well seasoned by two years' campaigning, from which the weakly individuals had already been withdrawn; the transport consisted of one kind only, viz., mules, ponies, and donkeys; it had no wheeled carriage—not even a battery of field artillery. The followers were limited to the least possible number consistent with necessity, and the country to be traversed was comparatively open and easy, frequently permitting of movement on a broad front, instead of being restricted to one continuous stream; whilst the total strength, about 20,000 men, including followers, was about one-third the strength of the numbers to be passed through the Khyber.

The Kabul Force, including also the troops on the line of communications, &c., numbered (with followers) some 60,000 men. It was hampered with depôts of the Ordnance, Medical, Commissariat, and Transport Departments, the Artillery and Engineer Field Parks, the wire of the Telegraph Department, and with the excess baggage of the Kandahar Column, together with a large retinue of public and bazaar camp followers, sutlers, and the accumulated *et ceteras* connected with an army of occupation. The operation of withdrawing the field parks and heaviest stores had commenced some time before the evacuation of Kabul. The transport consisted of every description of carriage, carts, hackeries, eckhas, elephants, camels, mules, ponies, donkeys, and pack bullocks. Rafts were also employed on the river between Jellalabad and Dakha for the carriage of heavy stores.

The road throughout, though good, was more or less confined, and

[1] For a report of this march see "R.U.S.I. Journal," vol. xxv, of 1881.

led over passes and through defiles where a single break-down necessitated a check all along the line.

On August 8 the several brigades forming the Kandahar Column, under General Sir Frederick Roberts, moved into camp at Beni Hissa, and on the following day commenced their world-renowned march.

The remaining troops at Kabul were formed into one division, under Major-General J. Hills, V.C., C.B., and consisted of the following, viz.:—

Royal Artillery .. 11/11 Garrison Battery.
G/4 Field Battery.
Cavalry ..... 1st Punjab Cavalry.
2nd " "
1st Brigade—Brigadier-General C. Gough, V.C., C.B.:
2/9th Foot (Norfolk Regiment).
28th Native Infantry.
45th Rattray's Sikhs.
2nd Brigade—Brigadier-General R. J. Hughes:
59th Foot (East Lancashire Regiment).
3rd Ghoorkhas.
19th Punjab Native Infantry.[1]
3rd Brigade—Brigadier-General W. Daunt:
67th Foot (Hampshire Regiment).
27th Punjab Native Infantry.[1]
5th Punjab Infantry.
Divisional Corps—3 companies Bengal Sappers and Miners.
The Corps of Guides.

The actual strength of the force which marched out of Kabul towards Peshawar was as follows:—

(*From a Return dated 17th August, including the Garrisons as far as Jagdallak.*)

British Officers.	European troops.	Total Europeans.	Native troops.	Total European and native troops.	Followers.[2]	Horses.	Camels.	Ponies.	Mules.	Draught bullocks.	Hackeries, donkeys, &c.
139	1,961	2,100	5,331	7,431	3,411	1,372	2,089	1,694	754	282	

The undermentioned troops had left Kabul previously on their return journey to India, and are not included in these numbers:—

[1] Part sent on with convoys.
[2] Regimental followers only.

A/B Royal Horse Artillery.
G/3 Royal Artillery, Field Battery.
6/11 „ Elephant Battery.
12/9 „ „
19th Bengal Lancers.
5 companies Bengal Sappers.
} about 2,000 men.

In addition to the foregoing there were, on the "Line of Communications" between Butkhak and Landi Kotal, under Major-General R. O. Bright, C.B. (whose headquarters were at Safed Sang), some 14,000 troops, disposed of as follows, viz.:—

3rd Section.—From Butkhak to Safed Sang, under Brigadier-General R. Sale-Hill:
2 guns, No. 4 Hazara Mountain Battery (from Kabul).
6th Dragoon Guards (Carabiniers).
17th Bengal Cavalry.
25th King's Own Scottish Borderers.
22nd Punjab Native Infantry.
30th „ „ „

2nd Section.—From Rozabad to Dakha, under Brigadier-General J. Doran, C.B.:
C/3 Royal Artillery, Field Battery.
Part of 5th Bengal Cavalry.
8th Native Infantry.
9th „ „ (part of).
1st Madras Native Infantry (part of).
15th „ „ „

(The 1st Section, from Landi Kotal to Peshawar, is not included in this statement.)

The following "Movable Columns" were also held available in the vicinity of the main road:

No. 1 Movable Column.—From Safed Sang, at Mardandan (overlooking the Hissarak Valley):
4th Bengal Cavalry (part of).
51st King's Own Light Infantry (1st Battalion South Yorkshire Regiment).
31st Native Infantry.
1st Ghoorkhas.

No. 2 Movable Column.—Near Jellalabad:
2 guns, No. 1 Mountain Battery.
4th Bengal Cavalry (Headquarters).
2/5th Fusiliers (Northumberland Fusiliers).
9th Native Infantry (Headquarters).
1st Madras Native Infantry (part of).

At Pesh Bolak:
L/5 Royal Artillery.
5th Bengal Cavalry (Headquarters).
2/14th Foot (Prince of Wales' York Regiment).
32nd N. I. Pioneers.
1 company Madras Sappers and Miners.

Early in the morning of August 11 the newly-appointed Amir, Sirdar Abdul Rahman Khan, arrived in Kabul, and held a Durbar outside the Sherpur cantonments, which was attended by General Sir Donald Stewart and the Officers of his Staff, &c.

In the mean time the Bala Hissa and forts were made over to the Amir's Officers, and the troops under Major-General J. Hills, V.C., C.B., commenced their march to Batkhak, which was reached without any disturbance or excitement early in the afternoon.

A few days prior to the evacuation of Kabul, instructions had been issued to General Bright, C.B., Commanding the Line of Communications, to reduce the garrisons of all the posts along the line, and to pass on the surplus to India. Orders were at the same time given for the "Movable Columns" to fit in at given points on the main route by certain dates.

A detailed programme[1] of the movements of each corps had also been prepared and distributed to the Generals and Heads of Departments, so that all necessary arrangements for forage and provisions might be made. It will thus be seen that a simultaneous movement was in progress along the whole line. This had to be carefully watched, and, in order to prevent any clashing, corps and detachments were directed to telegraph daily to Headquarters their arrival at the next stage.

On August 12 Major-General Hills's division, with Headquarters, started at 5 A.M. for Lataband. Owing to want of encamping space, the rear brigade, Brigadier-General C. Gough's, was halted and encamped at Fort Nicholson, an old ruin about 2 miles short of Lataband.

The column resumed its march at 5 A.M. on the 13th, crossing *en route* the Lataband Kotal, from whence a last peep at the Kabul Valley was obtained. This was one of the most difficult and trying marches in the whole journey. The rear brigade, Brigadier-General Gough's, did not arrive at Seh Baba until about 9.30 P.M., its progress being delayed by the long train of baggage belonging to the column.

It is impossible to describe in any adequate terms the difficulties and perplexities which devolve upon the rear guard of an army marching by confined waterless roads in a mountainous region under a broiling sun. Loads get displaced and must be readjusted; a pony or a camel casts its load, which must be replaced or transferred to another animal, or a wheel comes off in the narrowest and most difficult part of the road. Each and every such incident causes

[1] *Vide* Table of Marches.

a check along the whole line and a huddling together of animals ensues, ponies and mules begin to fight and kick; weak and jaded followers declare they cannot march, but they must be got in somehow. Such, in a few words, are some of the ever-recurring dilemmas which, from morn till night, tax the patience and endurance of a baggage or rear guard. The embarrassments above referred to are considerably enhanced when, as in this instance, the transport is of a very mixed kind. Movement must then be regulated by the pace of the slowest animal. It is marvellous to state that throughout the entire journey to Peshawar no serious mishap or loss of any kind was experienced.

On August 14, the 2nd and 3rd Brigades marched to Jagdallak, and the 1st Brigade was halted at Seh Baba.

On August 15, the 2nd Brigade advanced to Pezwan. The 3rd Brigade halted at Jagdallak and was joined the same day by the 1st Brigade.

Some attempt at marauding occurred near Pezwan. The Guides were sent back to ascertain the cause of the disturbance, some shots were exchanged, 1 horse being killed and 1 wounded. The quarrel appears to have been amongst the freebooters themselves and not with our troops or followers, who were never molested on one single occasion.

On the 16th, the 2nd Brigade marched to Safed Sang, the 3rd Brigade to Pezwan, whilst the 1st Brigade, with Major-General Hills, remained at Jagdallak.

On the 17th, the 2nd Brigade halted at Safed Sang and was joined by the 3rd Brigade, General Hills moving on with the 1st Brigade to Pezwan.

The accumulated detachments of the posts evacuated, consisting of the 22nd, 27th, and 30th P.N.I., the 4th Madras N.I., &c., were formed into a separate party and passed on in advance of the Division with instructions to proceed, stage by stage, to Dakha.

On August 18, Major-General Hills arrived with the 1st Brigade at Safed Sang, where the Division was again re-formed.

Owing to the scant supply of water and limited encamping spaces in the 3rd portion of the route, through the Khyber, it became necessary on arrival at Dakha to resort to a filtration process, so to say, and pass on the troops by detachments not exceeding about half a brigade at a time. But as Dakha was by no means a healthy locality for the encampment of a large body of men, it was decided to halt the Division for some days at Safed Sang and Jellalabad, whence the brigades were pushed on as occasion required.

The last brigade to arrive at Dakha was Brigadier-General Gough's, on September 1.

It was on political grounds detained there for some days, or would, in accordance with the prearranged programme, have reached Peshawar on September 6.

The actual marches made by the troops from start to finish and the time taken *en route* are given in the Table of Marches.

It will thus be seen that the journey of 170 miles[1] was performed in twenty-seven days, or an average of about 6½ miles a day.

It may not be generally known that the Government of India was strongly opposed to the withdrawal taking place during the summer months, but Sir Donald Stewart, ever mindful of his men, had carefully considered the causes which produce fever, ague, and other diseases on the frontier, and he did not hesitate to assert his conviction. He maintained that though marching in the heat of summer might be attended with "discomfort and inconvenience," the general health of the troops would not be likely to suffer; whereas, he contended, exposure to sudden changes of temperature between hot days and cold nights would probably result in diseases which might prove fatal to the success of the undertaking.

To his uncompromising sound judgment and astute persistency in prevailing upon Government to accept his views is due the extraordinary immunity from sickness which characterised this march; and to his skilful diplomacy in dealing with the local Sirdars along the route must also be attributed the unprecedented peaceful attitude of the tribes. Never in the history of our frontier wars had such a thing been known as a "retirement" without attempts at depredation, or fighting of some sort.

Taking into consideration the size of the Army (23,000 men); the number of camp followers (some 40,000 at least); the large quantity of stores, ammunition, and supplies; the mixed description of transport; the difficult nature of the country; the lawless, freebooting character of the tribes along the route; and the season of the year when the march was made, it is not too much to say that the return of the Afghan Field Force to India in 1880, under General Sir Donald Stewart, is one of the most striking examples on record of how a highly-disciplined, well-organized force in the hands of a skilful General can successfully overcome the greatest difficulties.

[1] The distances given in the map "Two Routes to Kabul," 1878—79, and the section—or elevation—map do not correspond: the former gives the total distance as 181½ miles; the latter 172 miles.

Posts on the Line of Communication with Reduced Garrisons.	Aug. 11th, 1880.	12th.	13th.	14th.	15th.	16th.
1. Butkhak.	Division.					
2. Lataband. (27th N.I. 400. 17th B.C. 20.)	Sick and Ammn. 19th N.I., 3 Troops 2 P.C.	Division.				
3. Seh Baba. (30th N.I. 300. 17th B.C. 20.)		Sick and Ammn. 19th N.I. 3 T. 2nd P.C. H.Qr. 17th B.C. Det. 27th N.I.	Division.	1st Brigade.		
4. Jagdallak. (30 N.I. 400. 17th B.C. 20. Kotal. — 1 Co. 1/25th. 17 B.C. 4.)			Sick and Ammn. 19 N.I. 3 T. 2 P. Cav. 17th B.C. (Det.). 27th N.I. (400). 30th N.I. (300). 2 Gs. Haz. M.By.	2nd Brigade. 3rd ,,	1st Brigade. 3rd ,,	1st Brigad 2/9th Foo 28 N.I. 45 N.I. 1st P.C. 4 Gns. 11/11
5. Pezwan. (1 Co. 1/25th. 17th B.C. 20. 22nd P.I. 400.)	A/B. R.H.A. 3 T. 19 B.L. 1 Co. Sappers. H.Qr. 22nd P.I.			Sick and Ammn. 19 N.I. 3 T. 2 P. Cav. 17th B.C. (Det.). 27th N.I. (400). 30th N.I. (300). 2 Guns H.M. By.	2nd Brigade and Guides. G/4 R.A.	3rd Brigad 67th Reg. 5th P.I. 1 S. 2 P.C 2 Gns. 11/11
6. Safed Sang. 4 M.N.I. 400. 17th B.C. Det. 1/25th 100.)	G/3 R.A. 6/11 ,, 12/9 ,, Det. 1 Goorkha. 1 S 19th B.L. 5 Cos. Sappers.	A/B. R.H.A. 19 B.L. 3 Troops. 1 Co. Sappers. H.Qr. 1/25th, 3 Cos.	H.Qr. 1/25th. H.Qr. 19 B.L.		Sick and Ammn. 19 N.I. 3 T. 2 P. C. 17 B.C. 27 N.I. 30 N.I. 22 N.I. 2 Guns, H.M.By.	2nd Brigad Guides. G/4 R.A. 1 Co. Sappe Garrisons Posts Evacuate
7. Fort Battye. (1 M.N.I. 100. 17th B.C. 20).	No. 1 Moveable Column. — 51st K.O.L.I. 1st Goorkhas. 31st P.I. 4 B.C. (Det.).	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 S. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.	H.Qr. 1/25th. H.Qr. 19 B.L. Field Hospital. Eng. Field Pk.		Sick and Ammn. 19th N.I. 3 T. 2 P.C 17th B.C. (De
8. Rozabad. 1 M.N.I. (100). 17 B.C. (20).	C/3 R.A. 2 Cos. M. Sap. 1 Sq. Carb. 8 N.I. (250).	1 Mov. Col.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 Sq. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.	H.Qr. 1/25th. 19 B.L. Field Hospital. Eng. F. Park.	
9. Jellalabad. 1 M.N.I. (200). 8 N.I. (400). 4 B.C. (100).		C/3 R.A. 2 Cos. M. Sap. 1 Sq. Carb. 8 N.I. (250).	1 Mov. Col.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 sq. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.	H Qr. 1/25t 19 B.L. F. Hospital Eng. F. Par
10. Ali Boghan. 1 M.N.I. (50). 17 B.C. (20).	2 Mov. Col. 5 Fus. (300). 9 N.I. (300). No. 1 Mn. By., 2 Guns. 1 Co. Sappers. 4 B.C. (Det.).		C/3 R.A. 2 Cos. Sappers. 1 Sq. Carb. 5 Fus. (200).	1 Mov. Col.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 Sq. Carb.	A/B. R.H.A 1 Co. Sapper 1 Sq. Carb. 1 Co. 1/25th.

TABLE OF MARCHE

16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	24th.
Brigade. th Foot. 8 N.I. 5 N.I. t P.C. . 11/11 R.A.								
Brigade. h Reg. h P.I. . 2 P.C. 11/11 R.A.	Gen. Hills. — 1st Brigade.							
Brigade. uides. 4 R.A. Sappers. rrisons of Posts acuated.	3rd Brigade. 2nd ,, Guides. G/4. 1 Co. Sappers.	Gen. Hills. — 1st Brigade. 2nd ,, 3rd ,, Guides. G/4. 11/11 R.A. 1 P.C., 2 P.C.	Gen. Hills. — 1st Brigade. 3rd ,,	Gen. Hills. — 1st Brigade. 3rd ,,	1st Brigade. 2/9th Foot. 28 N.I. 45 N.I. 1 P.C. 4 Gns. 11/11 R.A.	1st Brigade.		
k and mmn. h N.I. . 2 P.C. .C. (Det.).	1/25th, 2 Cos. 22nd N.I. 27th N.I. (½). 30th N.I. 4th M.N.I. Hazara M. By. Kahal. Tel. Wire		2nd Brigade.		3rd Brigade.		1st Brigade.	
	Sick and Ammn. 19 N.I. 3 T. 2 P. Cav. 17 B.C. (Det.).	1/25th, 2 Cos. 22 N.I. 27 N.I (½). 30 N.I. 4 M.N.I. Hazara M. By. Kahal. Tel. Wire		2nd Brigade.		3rd Brigade.		1st Brigade.
. 1/25th. B.L. ospital. F. Park.		Sick and Ammn. 19 N.I. 3 T. 2 P.C. 17 B.C. (Det.).	2 Cos. 1/25th. 22 N.I. 27 N.I. (½). 30 N.I. 4 M.N.I. Hazara M. By. — Sick and Ammn. 19 P.N.I 3 T. 2 P.C. 17 B.C.	2 Cos. 1/25th. 22 N.I. 27 N.I (½). 30 N.I. 4 M.N.I. Hazara M. By. 3 Sq. 17 B.C.	2nd Brigade. — 59th Regt. 3 Goorkh. G/4 R.A. 1 T. 2 P.C. 2 Cos. 1/25th. 30 N.I. 4 M.N.I. 2 S. 17 B.C.	2nd Brigade.	2nd Brigade. 3rd ,,	3rd Brigade. ½ 2nd ,,
R.H.A. Sappers. Carb. 1/25th.	H.Qr. 1/25th. 19 B.L. Hospital. Eng. F. Park.	H.Qr. 1/25th. 19 B.L. Hospital and E.F.P.	H.Qr. 1/25th. 19 B L. Hospital and E.F.P.	Sick and Ammn. 19 N.I. 3 T. 2 P. Cav.	2 Cos. 1/25th. 22 N I. 27 N.I (½). Hazara M.B. 1 S. 17 B.C.	30 N.I. 4 M N.I. 2 Sq. 17 B.C.	(Jellalabad Gar.). 8 N.I. 1 M.N.I. (Det.). 4 B.C. (Det.)	(½ 2nd Brigade.) — 59th Reg. G/4 R.A. 1 Sq. 1st P.C.

	Aug. 11th. 1880.	12th.	13th.	14th.	15th.	16th.
10. **Ali Boghan.** 1 M.N.I. (50). 17 B.C. (20).	2 Mov. Col. 5 Fus. (300). 9 N.I. (390). No. 1 Mn. By., 2 Guns. 1 Co. Sappers. 4 B.C. (Det.).		C/3 R.A. 2 Cos. Sappers. 1 Sq. Carb. 5 Fus. (200).	1 Mov. Col.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 Sq. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.
11. **Lachipur.** 1 M.N.I. (50). 5th B.C. (20).		2 Mov. Col. 5 Fus. (300). 9 N.I. (450). 1 Mn. Bat. 2 G. 1 Co. Sappers. 4 B.C.			1 Mov. Col.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 Sq. Carb.
12. **Chardeh.** 1 M.N.I (50). 5 B.C. (20).	1 M.N.I. (300). 9 N.I. (300). Kahal. Sick. 27 N.I. (180).					1 Mov. Col.
13. **Basawal.** 1 M.N.I. (150). 5 B.C. (50).		1 M.N.I. (300). 9 N.I. (300). Kahal. Sick. 27 N.I. (180). Pesh. Bolak Gar. 4/5 R.A., 2/14th. 32 N.I. (4). 5 B.C. (Det.).				
14. **Dakha.** 1 M.N.I. (140). 9 N.I. (100). 15 M.N.I. (400). 5 B.C. (50).			1 M.N.I. (300). 9 N.I. (300). Kahal. Sick 27 P.I. (180). L/5 R.A. 2/14th. 32 N.I. 5 B.C. (Det.).	2/14th, 6 Cos. 32 N.I., 4 Cos. 5 B.C. (Det.).		
15. **Landi Khana.**				L/5 R.A. 2 Cos. 2/14th. 2 Cos. 32nd. Kahal. Sick.	6 Cos. 2/14th. 4 ,, 32 N.I. 5 B.C. (Det.).	
16. **Kata Kushtia.**			Convoys and Detachments.	Convoys and Detachments.	Convoys and Detachments.	
17. **Shagai** (Jamrud).		Convoys and Detachments.				
18. **Hurri Sing Ka Burj** (Peshawar).						Det. 32 N.I. ,, 27 ,,

This Return is

			19 P.N.I 3 T. 2 P.C. 17 B.C.		4 M.N.I. 2 S. 17 B.C.			
.H.A. ppers. Carb. 25th.	H.Qr. 1/25th. 19 B.L. Hospital. Eng. F. Park.	H.Qr. 1/25th. 19 B.L. Hospital and E.F.P.	H.Qr. 1/25th. 19 B L. Hospital and E.F.P.	Sick and Ammn. 19 N.I. 3 T. 2 P. Cav.	2 Cos. 1/25th. 22 N I. 27 N.I (½). Hazara M.B. 1 S. 17 B.C.	30 N.I. 4 M N.I. 2 Sq. 17 B.C.	(Jellalabad Gar.). 8 N.I. 1 M.N.I. (Det.). 4 B.C. (Det.)	(½ 2nd Brigade.) — 59th Reg. G/4 R.A. 1 Sq. 1st P.C.
R.A. ,, ,, ppers. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.							
. Col.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers.	A/B. R.H.A. 1 Co Sappers. 1 Sq. Carb. 1 Co. 1/25th.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.					
	1 Mov. Col.	G/3 R.A. 6/11 ,, 12 9 ,, 5 Cos. Sappers. 1 Sq. Carb.	G/3 R.A. 6/11 ,, 12/9 ,, 5 Cos. Sappers. 1 Sq. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th. G/3 R.A. 2 Cos. Sappers. 1 Sq. Carb.	A/B. R.H A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.			
		1 Mov. Col. — 51st K.O.L.I. (550). 1 Goorkh. (½). 31 N.I. 4 B.C. (Det.).	1 Goorkh. (½). ½ 31 N.I. 4 B.C. (Det.).	6/11 R.A. 12/9 ,, 3 Cos. Sappers.	G/3 R.A. 2 Cos. Sappers. 1 Sq. Carb.			
	15 M.N I. (Det.) and Convoy.		51st K.O.L.I. ½ 31 N.I. 4 B.C. (Det.).					
N.I. ,,	L/5 R.A. 2 Cos. 2/14th. 2 Cos. 32 N.I. Kahal. Sick. 27 N.I. (180).	6 Cos. 2/14th. 4 Cos. 32 N.I. 5 B.C. (H.Qr.).	5 Fus. (360). 9 N.I. (450). 1 Mn. By. 2 G. 1 Co. Sappers. 4 Ben. Cav. (Det.).	15 M.N.I. and Convoy.	C/3 R.A. 2 Cos. Sappers. 1 Sq. Carb. 5 Fus. (200).	51st K.O.L.I. (550). ½ 31 N.I. 4 B.C. (Det.).	1 Goorkh. 31 N.I. (½). 4 B.C. (Det.).	6/11 R.A. 12/9 ,, 3 Cos. Sappers.
.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	24th.

urn is necessarily incomplete owing to Detachments with Convoys, &c. It includes only the Troops on the Line between 10th Augu

MARCHES.

	24th.	25th.	26th.	27th.	28th.	29th.	30th.
					DIVISION. Maj.-Gen. J. HILLS, V.C., C.B.		
					1st Brigade. Br.-Gen. W. Daunt 2/9th Foot. 28 N.I. 45 N.I.	2nd Brigade. Br.-Gen. R. Hughes. 59th Foot. 3rd Goorkhas. 19 N.I.	3rd Brig Br.-Gen C. Gough, C.B. 67th Re 27th N. 5th P.I
					ARTILLERY. G/4 R.A. 11/11 R.A.		
					CAVALRY. 1st Punjab Cavalry. 2nd ,, ,,		
					DIVISIONAL TROOPS. Sappers and Miners Corps of Guides.		
					TROOPS MARCHING INDEPENDENT A/B Royal Horse Artillery G/3 Royal Artillery. 6/11 ,, ,, 12/9 ,, ,, 19th Bengal Lancers. 5 Cos. Bengal Sappers. Various Detachments with Convoys.		
	1st Brigade.						
	3rd Brigade. ½ 2nd ,,	1st Brigade. 3rd ,,	1st Brigade. ½ 3rd ,,	1st Brigade.			
	(½ 2nd Brigade.) 59th Reg. G/4 R.A. 1 Sq. 1st P.C.	(½ 2nd Brigade.) 3 Goorkhas. 1 Co. Sappers. 2 Cos. 1/25th. 1 T. 2 P.C.	(½ 3rd Brigade.) 67th Regt. 2 Gns. 11/11 R.A. I.T. Guides.	(½ 3rd Brigade.) 5th P.I. Guides	1st Brigade 2/9th. 28 N.I. 45th N.I. 1st P.C. 4 Guns 11/11 R.A.		

To face page 132.

30th.	31st.	Sept 1st.	2nd.	3rd.	4th.	5th.	Sept. 6th, 1880.

LINE OF COMMUNICATIONS.

C.B. — Maj.-Gen. R. O. BRIGHT, C.B.

rd Brigade.	3rd Section.		2nd Section.		No. 1 Mov. Col.	No. 2 Mov. Col.	Pesh Bolak.
Br.-Gen. Gough, V.C., C.B.	Br.-Gen. R. Sale Hill.		Br.-Gen. J. Doran, C.B.		2 Guns, 4 M. By. (from Kabul.)	1 Mount. By. (2 guns).	4/5 R.A.
57th Reg.	No. 4 M. By.	Butkhak	C/3 R.A.	Rozabad	4 B.C. (part of).	4 B.C. (H. Qr.).	5 B.C. (H. Qr.),
27th N.I.	6th D.G. (Carb.)		4 B.C. (part of).		51st K.O.L.I.	2/5th Fus.	2/14th Reg.
5th P.I.	17th B.C.		5 B.C. (part of).		31st P.I.	9 N.I. (part of).	32nd N.I.
	1/25th Reg.	to	8th N.I.	to	1st Goorkhas,	4th M.N.I.	1 Co. M. Sap.
	22nd P.I.		9th N.I.				
	30th P.I.		4th M.N.I. (part of).				
	Gen. Hos. and Depots at Safed Sang.	Safed Sing.	15th M.N.I.	Dakha.			
			Gen. Hos. and Depots at Jellalabad.				

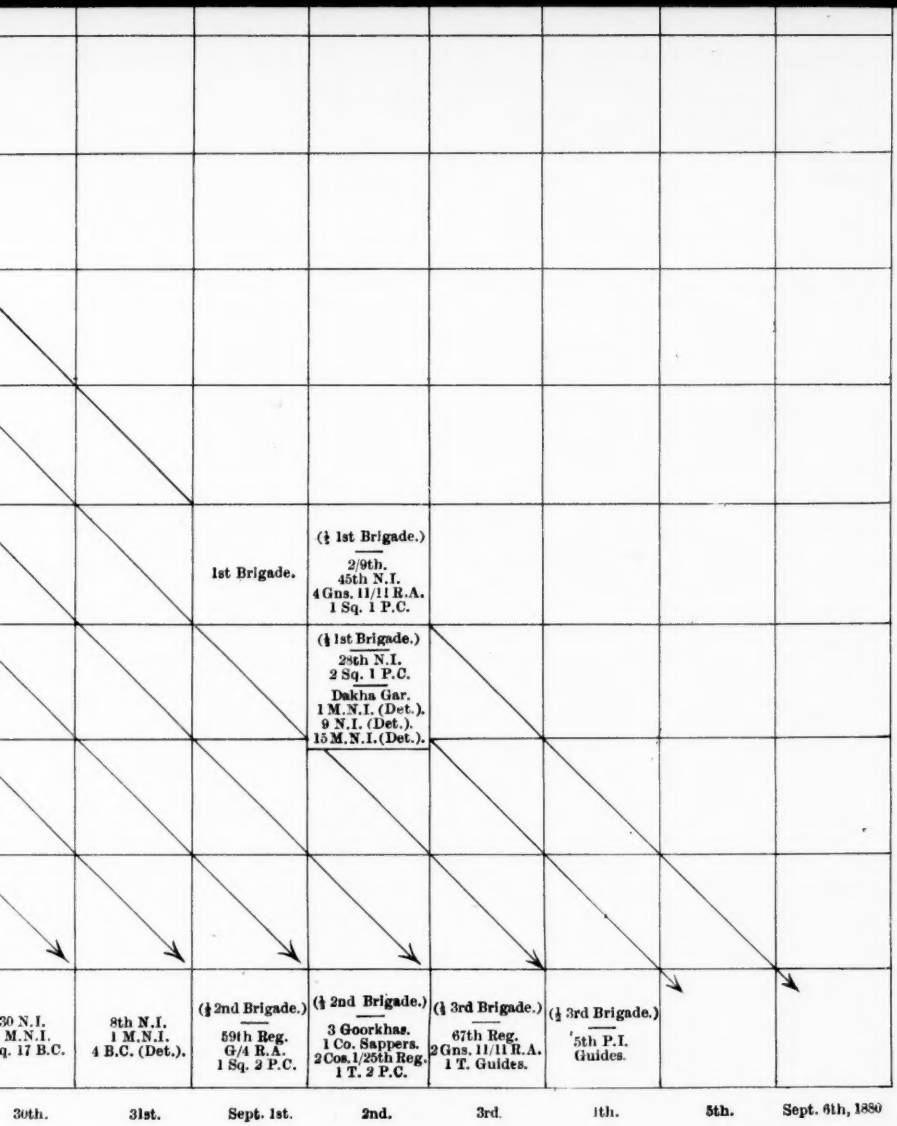
DENTLY.

Y

AVOYS.

d t.) .)	(½ 2nd Brigade.) 59th Reg. G/4 R.A. 1 Sq. 1st P.C.	(½ 2nd Brigade.) 3 Goorkhas. 1 Co. Sappers. 2 Cos. 1/25th. 1 T. 2 P.C.	(½ 3rd Brigade.) 67th Regt. 2 Gns. 11/11 R.A. I.T. Guides.	(½ 3rd Brigade.) 5th P.I. Guides	1st Brigade 2/9th. 28 N.I. 45th N.I. 1st P.C. 4 Gns. 11/11 R.A.		
.). t.).	6/11 R.A. 12/9 ,, 3 Cos. Sappers.	G/3 R.A. 2 Cos. Sappers. 1 Sq. Carb.	A/B. R.H.A. 1 Co. Sappers. 1 Sq. Carb. 1 Co. 1/25th.	H. Qr. 1/25th. 19th B.I. Hospital and Eng. F. Park.	Sick and Ammn. 19 N.I. 2 Sq. 2 P.C.	2 Cos. 1/25th. 22 N.I. 27 N.I. (½). Hazara Mn. By. 1 Sq. 17 B.C.	30 N.I. 4 M.N.I 2 Sq. 17 B.
	24th.	25th.	26th.	27th.	28th.	29th.	30th.

e between 10th August and 6th September. Several Corps and Detachments had already started on their Ret


(½ 1st Brigade.)
2/9th.
45th N.I.
4 Gns. 11/11 R.A.
1 Sq. 1 P.C.
1st Brigade.
(½ 1st Brigade.)
28th N.I.
2 Sq. 1 P.C.
Dakha Gar.
1 M.N.I. (Det.).
9 N.I. (Det.).
15 M.N.I. (Det.).
30 N.I.
M.N.I.
q. 17 B.C.
8th N.I.
1 M.N.I.
4 B.C. (Det.).
(½ 2nd Brigade.)
59th Reg.
G/4 R.A.
1 Sq. 2 P.C.
(½ 2nd Brigade.)
3 Goorkhas.
1 Co. Sappers.
2 Cos. 1/25th Reg.
1 T. 2 P.C.
(½ 3rd Brigade.)
67th Reg.
2 Gns. 11/11 R.A.
1 T. Guides.
(½ 3rd Brigade.)
5th P.I.
Guides.
30th.
31st.
Sept. 1st.
2nd.
3rd.
4th.
5th.
Sept. 6th, 1880

eir Return.

THE TURKISH JANISSARIES.

By Major-General F. H. Tyrrell, Madras Army.

"Hört nur! Einst jagten wir Husaren
Den Feind nach Herzenslust;
Da schoss ein Hund von Janitscharen
Den Hauptmann in die Brust."

The interest of the following paper is purely antiquarian. It refers to a state of things passed away, without a chance of recurrence or resuscitation. It is intended only as a contribution to military history, a record of the organization of the first standing army seen in Europe, and a unique instance of such an institution in an Oriental State and Nation. The details here given do not, to my knowledge, occur in any English work. I have taken them partly from the descriptions of the Ottoman Empire by Marsigli and Mouradjia d'Ohsson, published in the 18th century, but principally from the work entitled in French "État Militaire Ottoman depuis la Fondation de l'Empire jusqu'à nos jours," from the pen of H. E. Ahmad Javád Páshá, the present able Prime Minister of the Ottoman Empire. The first volume of this work, which contains the history of the corps of Janissaries from its foundation in 1326 to its suppression in 1826, is, so far as I can discover, the only one of the twenty-two volumes comprised in the scheme of the work which has been translated into French from the original Turkish. According to the preface, the first seven volumes of this monumental work were to comprise the history of the Turkish infantry; the eighth and ninth volumes that of the artillery and engineers; the tenth, eleventh, and twelfth that of the cavalry; the thirteenth treats of tactics and evolutions of the three arms combined; the fourteenth to the twentieth volumes contain the record of the wars of the Empire from its foundation to the present day; and the twenty-first and twenty-second volumes comprise an account of the naval and marine forces of the Empire, and of the maritime wars of the Turks.

It is curious to observe that the principle of universal military service, which has just been reintroduced into the Ottoman Empire under the auspices of Ahmad Javád Páshá, was in force among the Turks from the foundation of the nation by Othmán Khán; and that they possessed a standing army of soldiers, paid, lodged, and rationed by the State, 200 years before the establishment of a similar force in any country of Christendom.

The whole Osmanli nation formed an army, of which the Sultan was *ex officio* Commander-in-Chief, with the Grand Vazir as his Lieutenant.

The national forces were divided into paid and unpaid troops; or, as we should now say, regulars and irregulars.

The first category, or paid troops, comprised—

1. Six regiments of cavalry (Sipáhis).
2. The Corps of Infantry (Janissaries), organized in 195 companies.
3. The Corps of Artillery (Topjis) } Organized in companies.
4. The Corps of Ordnance Storekeepers (Jebejis) } Organized in companies.
5. The Corps of Artillery Drivers (Top Arábajis) } Organized in companies.
6. The Corps of Bombardiers (Khumpárajis) } Organized in companies.
7. The Corps of Sappers (Laghúmjis) } Organized in companies.
8. The Corps of Recruits (Ajam Oghláns), or Training Depôt } Organized in companies.
9. The Corps of Water Carriers (Sakkas).

Cavalry.—The six regiments of cavalry had no numbers; they were distinguished by their titles and by the colours of their standards, as follows:—

Ságh Ulúfaji (right soldati), standard red and white.
Sol Ulúfaji (left soldati), standard yellow and white.
Ságh Ghurabá (right foreigners), standard green.
Sol Ghurabá (left foreigners), standard white.
Sipáhis (troopers), standard red.
Siláhdárs (gens d'armes), standard yellow.

The word Sipáhi, which was the specific designation of one of the regiments, was used by the Turks commonly to describe all the paid cavalry; in fact, it was used much as the word Dragoon is used in English; sometimes to denote a particular description of cavalry, sometimes for any horse soldier.

The four senior regiments were the oldest paid troops in the Ottoman army, and were called the Bulúkiát-i-Arbia, or "Four Troops."

In war they escorted the Sultan's person and the Sanják-i-Sharíf, or Holy Standard of the Prophet.

The whole six regiments were spoken of as the Alti Buluk, or "Six Troops."

The Sipáhis, the Ságh Ulúfaji, and the Ságh Ghurabá were always stationed in the right wing in order of battle; the other three regiments in the left wing.

Organization.—The regiments were organized in troops (Bulúk) with a minimum strength of twenty-five and a maximum strength of thirty troopers. There was only one Officer to each troop, the Bulúk Báshi or Captain. There was no fixed number of troops for each regiment; the number was increased or reduced according to occasion. In the old muster rolls we find one regiment with 300 troops (from 7,000 to 9,000 men), and another with 100 troops (from 2,500 to 3,000 men).

Regimental Staff.—Each regiment had the following establishment of Officers, extra to the Bulúk Báshis, or troop leaders—

1. The Ághá, or Colonel.

2. The Básh Kiáyá (Ketkhudá), or Major.
3. The Kiáyá Yeri, or Adjutant.
4. The Básh Cháush, or Sergeant-major.
5. The Básh Bulúk Báshi, or Senior troop leader.

The Ághá was called by the name of his regiment, as Sipáhi Ághási, Silahdár Ághási, &c. The six Colonels ranked among the Ághayán-i Berún (Masters of the Exterior), or Chief Military Officers of the Porte.

The Básh Cháush performed the duties of a Provost-Marshal.

The Básh Bulúk Báshi answered to the Risaldar-Major in our Indian cavalry regiments.

The whole body of Officers of the paid cavalry were known by the generic name of the Bulúk Ághálari (Lords of the Troops).

Method of Recruiting, Pay, Equipment, &c.—The Sipáhis were recruited in several ways:—

1. From the pages of the Seraglio, who were all Christian boys captured in war or levied as tribute from the Rayahs; when fully grown these boys were always enrolled in the Sipáhis, if not otherwise provided for.
2. By transfer of men from the dismounted corps as a reward for distinguished service.
3. By enlistment of their own children or those of other Turks.

The troopers received a lump sum as pay, and found their own horses, arms, and equipment. Turkish writers allude to their distinctive dress, and also to their being armed with lances.

The regiments were generally quartered at Constantinople, sometimes at Adrianople and Broussa.

Infantry or Janissaries (Turkish Yangichari or New Militia).

Organization, Titles, and Numbers.—All the dismounted troops of the standing army were called Kápi Kuli (Slaves of the Porte). The Janissaries were commonly spoken of as the Kirk Bin Kul (40,000 slaves); they were also called Haji Bektash's soldiery, from their patron saint who had blessed the corps on its first institution.

The Janissaries were organized in companies, which were the largest tactical and administrative units then known in Europe. The companies were numbered consecutively on three separate lists.

The Jamá'ats (Arabic for company) of Yáyás (Turkish corruption of the Persian Piyáda, a foot soldier) were numbered from 1 to 101.

The Bulúks (Turkish for company) were numbered from 1 to 61.

The Odas (chambers) of Sagbáns (chasseurs) were numbered from 1 to 34.

The first ten Bulúks were raised in A.D. 1326 by the enrolment of captive Christian boys (Greeks, Sclavonians, and Armenians); the remainder were subsequently raised in the same manner.

The 101 Jamá'ats were formed from the Turkish irregular infantry (Yáyás). The 65th Jamá'at was afterwards broken up for misconduct, and its number remained vacant.

The thirty-four companies of Sagbáns were raised by Sultan Murád II from his falconers and huntsmen early in the 15th century, and after this no fresh companies were raised.

The Corps of Janissaries was called the Oják (Kitchen Range), from the free rations granted by the Sultan.

The companies were usually called Orta or Oda (chamber), from the barrack in which each company was separately lodged.

Strength and Establishments.—The company or Orta originally consisted of 6 Officers and 100 non-commissioned officers and men. This always remained the peace effective, but in modern times the strength of the Orta on taking the field was raised up to 500 men, by drafts from the Ajam Oghláns and by the reserve system hereafter described.

The 1st Orta of the Buluklis, in which the Sultan's name was enrolled as a private, was always kept at a peace strength of 500 men.

The 64th Orta of the Jamá'at, called the "Zágharjis," had a peace strength of 300 men.

The 68th Orta of the Jamá'at, called the "Turnajis," had a peace strength of 150 men.

The 71st Orta of the Jamá'at, called the "Samsúnjis," had a peace strength of 200 men.

These four Ortas were commanded by General Officers of the Corps.

The number of Officers in the company was never augmented, but remained the same in peace and in war.

The total strength of the corps in the reign of Sultan Sulimán the Magnificent was 20,000 men, giving 100 men per company. By augmentation for war, and for the service of the garrisons on the frontiers, this number was raised to 40,000; and by the inscription of Reserve Janissaries the nominal strength was raised to considerably more than 100,000 at the time of the dissolution of the corps.

Corps Staff.—The Headquarter Staff of the Corps of Janissaries received its final organization from Sultan Selim Yávuz (the Ferocious), the Conqueror of Egypt. Its Officers were called collectively "Oják Aghálari" (Lords of the Kitchen Range), and consisted of—

The Janissary Agha (Yangichari Ághási) or Captain-General. He was generally a Pasha of two horse-tails and had a seat in the Diván or Council of State.

The Kul Kiáyá (Master of the Slaves) or Lieutenant-General. This Officer was *ex officio* Captain of the 1st Company of Buluklis.

The Sagbán Báshi (Head Dog-Keeper), First Major-General, and titular chief of the Division of Sagbáns.

The Zágharji Báshi (Head Keeper of the Pointers), Second Major-General and *ex officio* Captain of the 64th Company of the Jamá'ats.

The Samsúnji Báshi (Head Keeper of the Mastiffs), Third Major-

General and *ex officio* Captain of the 71st Company of the Jamá'ats.

The Turnaji Báshi (Head Falconer), Fourth Major-General and *ex officio* Captain of the 68th Company of the Jamá'ats.

These six General Officers formed the Military Council or Diván of the corps.

Thirty-two Sarhad Ághás (Lords of the Marches), or Brigadier-Generals, commanded the brigades of Janissaries in garrison in the great fortresses on the frontiers. These were probably also Captains of companies in their command, but I can find no certain information on this point.

Forty Yáyá Beys (Infantry Colonels). These were the holders of as many military fiefs which were at the disposal of the Janissary Agha, and were granted to the General Officers and Captains of the corps at his discretion; the Officer accepting one of these fiefs vacated his office in the corps, obtaining the title of Yáyá Bey and the right to carry a horse-tail standard. The post answered to that of Regimental Colonel in the British and Indian Armies, and its emoluments corresponded to our off-reckonings.

The executive Officers of the Ághá's Staff at the corps headquarters were :—

The Mushir Ághá. *ex officio* Captain of the 25th Company of the Buluklis, which furnished the guards of the Grand Vazir's Office and Palace. He acted as intermediary between the latter official and the corps.

The Básh Cháush (Provost-Marshal or Sergeant-at-Arms), *ex officio* Captain of the 5th Company of Buluklis, attached to which was a picket band of Cháushes or Sergeants who acted as provosts and executioners of the corps under his orders.

The Kiáyá Yeri (Adjutant-General), *ex officio* Captain of the 32nd Company of the Buluklis which furnished the guards for the corps headquarters. All orders issued by the Ághá were signed by him.

Similarly all orders issued by the Sarhad Ághás on the frontiers were signed by the local Kiáyá Yeri (Brigade-Major) who was always a Captain of one of the companies in the garrison.

The Beit-ul Málji (Treasurer), *ex officio* Captain of the 101st Company of the Jamá'ats.

The Oják Imám (Corps Chaplain), *en officio* Captain of the 48th Company of the Jamá'ats.

The Yangichari Kátibi (Clerk of the Janissaries), a civilian official who had charge of the records of the corps, pay rolls, &c. He had a company of Yázijis (Scribes) at his command. But all orders relating to military duty were issued by the Kiáyá Yeri.

Company Officers.—The Officers of each Orta or company were:—

1. The Chorbaji (Soup-giver); or Captain.
2. The Oda-Báshi; or Lieutenant.
3. The Vakil-i Kharch; or Quartermaster.
4. The Bairakdár; or Ensign.
5. The Básh Eski (Ancient) or Básh Karákullukchi; or Corporal-Major.
6. The Áshchi-Báshi or Head Cook; also called the Ustá or Instructor.

In each Orta there was also a Sakka Báshi (Head Water Carrier), who ranked with the company officers.

The 1st and 5th Ortas of Buluklis only had an extra Officer, called the Zembilji.

The non-commissioned officers of the company were Kará Kullukchis or corporals; I cannot find it on record how many there were in the company.

Promotion.—All promotion was from the ranks: by selection from the privates and then by seniority to Oda-báshi. A vacancy in the rank of Chorbaji or Captain was filled by selection from the Oda-báshis, so that a Captain seldom commanded the company in which he rose. The Captains were promoted or exchanged indiscriminately between the companies of the three divisions.

The Captains were promoted by seniority or selection to the rank of Brigadier-General and Major-General, and the Major-Generals by seniority up to the Sagbán Báshi. The Kul Kiáyá (Lieutenant-General) and the Agha (Captain-General) were especially selected by the Sultan for their posts, and might be outsiders who had never served in the corps. These were the only exceptions to the rule that promotion should always go in the corps.

The institution of the Yáyá Beys, or Honorary Colonels, was designed to keep up a flow of promotion by making vacancies in the senior grades.

Badges and Distinctions.—Each company, besides its number, had a distinguishing badge (Nishán) which was painted over the barrack doors, on the lanterns, and on all the furniture of the company, embroidered on the flag and the canvas of the tents, and tattooed on the arms of every soldier of the company.

These badges were generally figures of animals and birds, weapons, anchors, cypress trees, &c.

Ahmad Javád Páshá has in his work given pictures of the Nisháns of all the Ortas.

Many of the companies were also distinguished by some title or nickname, as are the regiments in European armies.

Thus the 1st, 2nd, 3rd, 4th, 8th, 29th, 33rd, 39th, 40th, 46th, 56th, 57th, 95th, and 97th Companies of the Jamá'ats were distinguished by the title Dawajis or Shuturbáns (Turkish and Persian respectively for Cameleers). They are supposed to have been raised originally from the baggage guards of the Sultans. Of these the 1st and 95th have a camel for their badge.

The 14th, 49th, and 66th Jamá'ats are entitled Kháseki or Royal.

The 60th, 61st, 62nd, and 63rd Jamá'ats were the Solaks or Sinistrals; they formed a body-guard for the Sultan, and were so called because they retained their old equipment as archers, and those who marched on the right of the Sultan drew their bows with the left hand.

The 64th were the Zágharjis (Keepers of the Pointers); they had a full moon for their badge.

The 68th were the Turnajis (Falconers); they had a crane for their badge.

The 71st were the Samsúnjis (Keepers of the Mastiffs); they had a mastiff for their badge.

The 82nd Jamá'at were called the Zumburukchis (Arblasteers), and had a crossbow for their badge.

The 15th Jamá'at has a lion for badge.

The 16th and 18th have cannons.

The 24th has an open hand.

The 34th, 72nd, and 93rd have scaling ladders.

The 11th has a cypress tree; the 21st has a powder flask; the 53rd has a musket; and the 54th a bow and arrow.

The 43rd and 79th have elephants.

The 88th has an anchor.

The 8th and 31st Buluks have an anchor badge; it is said that the latter company was raised originally for the marine service.

The 19th, 29th, 44th, and 57th have cypress trees; some one, some two, some a bird perching atop.

The 7th and 58th have palm trees.

The 13th has a lion under a palm tree.

The 46th has a hatchet; the 50th a scaling ladder; the 56th a war galley.

The 45th Bulúk is singular in having a motto in *lieu* of a badge. It has "'Ala Allah Tawakkul" ("Our trust is in God").

The 55th Bulúk has the title Ta'álim Khánaji (Gymnasts).

The 33rd Orta of Sagbáns has the title of Avjis (Marksmen).

Pay.—The pay of all the paid troops was calculated by the day, but was only issued quarterly. The pay issued at the end of the quarter containing the months Muharram, Safar, and Rabiul Awwal was called from their initial letters "Masar," and the issues for the second, third, and fourth quarters were similarly respectively nicknamed Rajaj, Rashan, and Lazaz.

The quarterly pay was issued with great ceremony at the Porte in Constantinople, at the Pasha's treasury in the provincial towns. Muster rolls and pay abstracts were prepared and carefully checked beforehand. The pay was issued to the Officers, who carried it to the barracks, and paid the men.

Fac-similes and translations of old Janissary pay rolls are given in Ahmad Javád Pásha's book. The amount of the pay is in the figures called Siáqat or Raqam which are still used in Persia and India in commercial transactions, but are now obsolete in Turkey.

It is very difficult to estimate the amount of pay on account of the

difference of the coinage, the decrease in the value of money, and the continual debasement of the Turkish currency. The General Officers of the Janissaries received handsome allowances called "Arpalik" or forage allowance in addition to the pay of their rank.

The pay of the private on first enlistment was 1 *asper* a day, and was gradually augmented till a veteran of distinguished service might draw 40 *aspers* a day. The Janissary privates were divided into three classes for their pay; "Kuchiks," or young soldiers; "Amalmánda," or veterans; and "Oturaks," or sedentaries.

Each of these three classes was again sub-divided into grades with differing rates, much like the system of good conduct pay in our Indian Native Army.

In English money the pay of a Janissary might be said to vary from a farthing to 10*d.* a day.

A cash chest was kept in each company, and stoppages were made from the men for articles of dress and equipment, and for extras for the messing, accounts with the men under these headings being kept by the Quartermaster and the cook. The estates of deceased Janissaries went to the company chest.

Discipline.—The military code of the corps of Janissaries was concisely comprised in fourteen articles. Discipline was maintained by the following authorized punishments:—

1. Imprisonment in barracks for several days awardable by any Officer.
2. Blows with a stick, up to thirty-nine, awardable by the Captain or Lieutenant and inflicted by the latter in person.
3. Flogging up to seventy-nine lashes, awardable by a General Officer, and inflicted by Cháushes.
4. Imprisonment for a long period or for life in a castle used as a Janissary prison, by order of the Janissary Ághá.
5. Dismissal from the corps by order of the Janissary Ághá.
6. Death by strangling or decapitation, by order of the Janissary Ághá, subject to confirmation by the Kázi Askar or Army Judge.

The execution took place privately in the castle, and a gun was fired to announce that the sentence had been carried out.

Corporal punishment was inflicted by the bastinado on the soles of the feet in the case of Sipáhis; on the breech, in the case of the Janissaries and other dismounted troops.

The punishment of the stick, as used until lately in the Austrian Army, was probably borrowed from the Turkish practice.

The maximum number of thirty-nine and seventy-nine lashes remind us of the Jewish "forty stripes save one."

Dress.—Every Janissary received annually from the State 10 yds. of blue cloth, a piece of cotton for the turban, and a piece for the shirt; also a pair of red leather shoes. The regimental parade headdress was also issued by the State. It was a high cylindrical cap of white felt, with a copper plume case in front, and a strip of white felt hanging down behind to the shoulder. This was said to be in

imitation of the sleeve of the Saint Haji Bektash, who stretched his arm over the heads of the front rank when he consecrated the corps to the service of Islam.

The different ranks and offices were distinguished by differently shaped caps and turbans, some of them fantastic in the extreme.

The rank of the General Officers and Captains was denoted by the fashion of their plumes, as well as by the shape of their head-dresses.

The coats were long skirted, and were cut in a particular fashion for the different ranks.

The General Officers wore fur-trimmed robes.

On the march the long skirts of the coat were kilted by being tucked through the "kamarband," which was of silk or linen, striped, with fringed ends.

The Karakullukchis (Corporals) wore heavy girdles of copper which, according to Baron de Tott, "weigh 15 lbs., and with it these Officers may knock down and kill any Janissary."

The blue cloth of Salonica, issued by the State, was made into wide trousers, or "shalwar," worn by all ranks of the Janissaries.

The men generally wore red shoes; the Officers wore long boots; those of the Jamá'ats had yellow leather boots; the Officers of the Bulúks wore black boots, and those of the Sagbáns red boots.

The Áshchis (Cooks) wore black leather dresses studded with *plaques* and knobs of copper or silver, and carried large knives and cutlasses as emblems of their office. On State parades the Áshchi was supported by a Karakullukchi on each side, to enable him to sustain the weight of the metal ornaments with which he was loaded.

The dress of the Janissaries, like all the other institutions of the corps, seems to have altered in no essential particular during the whole period of five centuries through which it maintained its corporate existence.

Plates of Janissaries, of all ranks and grades, wearing their distinctive costumes, are given in the Album published with Ahmad Javád Páshá's "History of the Janissaries."

The Janissary non-commissioned officers and privates wore only mustachios, the rest of their face being clean shaven. The Officers wore beards.

All men, when transferred to the Oturak, or sedentary establishment, were allowed to grow their beards.

Arms and Equipment.—The arms were a musket, a sabre, and a yataghan, or long knife, chiefly used for cutting off heads. This knife was the only weapon carried by the soldier in time of peace, and kept by him in barracks. The other arms and the ammunition were lodged in magazines, under the charge of the Corps of Jebijis, and were only issued to the Janissaries when proceeding on service.

The ammunition was carried in a ball-bag and a powder-horn. The lead was issued to the men in bars, and they cast their own bullets to fit their muskets, which were of all kinds of calibre.

In time of peace the Janissaries carried long staves, and their

patrols, which acted as police in all their garrisons, had no other weapons.

Quarters.—The Headquarters of the corps at Constantinople was called the Ághá Kápúsi, and consisted of a mansion for the Ághá's official residence, a hall for the Diván or Council of the Corps, offices, and record rooms, and quarters for guards and orderlies.

There were two ranges of barracks at Constantinople, the Eski Odalar (old barracks) and the Yangi Odalar (new barracks). Each company had a separate barrack, a long narrow wooden building, with a raised shelf or daïs (sofa) running down one side, on which the men sat and slept.

They were lighted by lanterns, for which candles were issued by the State.

The company prison was in the kitchen, under the charge of the cook.

The Captain did not live in barracks; the Lieutenant (Oda-báshi) was the Senior Officer who lived under the same roof as the men. He was, in fact, the "company father," the Chorbaji or Captain having more the position of a Field Officer in European Armies. The Chorbajis of the Jamá'ats were mounted on parade; but those of the Buluklis and Sagbáns were not allowed to ride in the presence of a General Officer of the Corps.

The Janissaries in all the towns which were permanently garrisoned by the Corps were lodged by companies in ranges of barracks similar to those in the capital.

The Ortas of Janissaries had permanent headquarters at Constantinople, or at the great fortresses of the frontiers of the Empire. Of the 100 Ortas or Jamá'ats of Yáyás only eleven were stationed in the capital. These were the 39th, 59th, the 60th, 61st, 62nd, and 63rd, which four Ortas furnished companies of Solaks, or Archer Guards of the Sultan, the 64th Zagharjis, the 71st Samsúnjis, the 73rd, 94th, and 101st Ortas.

Of the 61 Ortas of the Buluklis, 30 were stationed in Constantinople. The 1st Orta was at the capital, the 2nd, 3rd, and 4th were in the provinces, the 5th and 6th at the capital, &c.

Of the 34 Ortas of Sagbáns, only the 33rd Awjis (Marksmen) was permanently stationed at the capital.

Ahmad Javád Páshá has given three distribution lists of the Janissaries in their various stations, one dated towards the end of the 17th century; another of the year A.D. 1723, and another of 1750.

In the first list there are 19 Ortas, numbering 3,800 men, at Baghdad, and 8 Ortas, with 1,200 men, at Bassorah; 6 Ortas, with 1,800 men, at Oczakoff; 14 Ortas, with 3,600 men, at Kaminick, in Poland; and 31 Ortas, with 4,500 men, in the island of Crete; these last two places were then recent conquests of the Ottomans.

In the list of A.D. 1723 the largest Janissary garrisons are Widdin and Belgrade, with 5,000 men each, Baghdad with nearly as many, Bender with 4,000, Choczim and Kars with 2,000, Oczakoff, Van, Braila, and the island of Crete with 1,500 each. There are many

garrisons where only a single Orta is stationed, with an effective of less than 100 men.

Thus in the list of A.D. 1750 there are 74 Janissaries in garrison at Batoum and 71 at Jerusalem.

The Senior Officer of the Janissaries in a station which was not the headquarters of a Sarhad Ághá (Brigadier-General) had the local title of Sirdár (Commandant).

The Janissaries serving at the permanent stations of their Ortas were called Yerli-kuli (territorial troops): those detached for temporary garrison were termed Naubatji (men on duty); they were relieved once in three years, or oftener.

The Sarhad Ághás of the Janissaries were entrusted with the keys of the great fortresses garrisoned by their men.

Standards and Insignia.—The Grand Standard (Liva) of the Corps of Janissaries was white with the device of a crescent and double-pointed scimitar embroidered in gold; the flag (Bairak) of each Orta was red with the same device in addition to the Nishán of the Orta.

Each company had two soup kettles, which served as its Palladia, and marked the headquarters and rallying-point of the company. If a company lost its kettles in action, all its Officers were cashiered, and it was re-formed with a fresh set of Officers. The first overt act of mutiny was always the overturning of the soup-kettles.

In the companies of Sagbáns the soldiers used to carry the wooden spoon with which they ate their soup stuck in the plume-case in front of their caps, and their Captains wore a soup-ladle instead of a plume, from whence they had the nickname of Káshukchi Báshi, or Chief of the Ladle. Silver badges, to be worn in the cap or turban, were given to Turkish soldiers for acts of uncommon bravery. Sabres and pelisses of honour were given to Officers sometimes individually for acts of valour and devotion, sometimes collectively for a successful battle or campaign.

Method of Enlistment.—The Janissaries were recruited in four different ways:—

1. By transfer from the depôt companies of Ajam Oghláns (foreign boys, recruits).
2. By transfer from the irregular infantry, Azabs, Levends, &c., as a reward for distinguished or meritorious service.
3. By enlistment of Turks, and of the sons of Janissaries, direct.
4. By enrolment of men as Yangichari Yamáki (Reserve Janissaries), who neither served with the kettles nor drew pay or rations in time of peace, but who could be called up to augment the strength of the company in time of war. This method of augmenting the strength was introduced in the early part of the seventeenth century, and had a fatal effect on the character of the corps. These Reserve Janissaries, though performing no duty, enjoyed all the prestige and privilege of Janissaries, being exempt from civil jurisdiction, and amenable only to the captain of their company. These latter enrolled as many Reserve men as they could to enhance their own im-

portance, and even Pashas enrolled themselves as Janissaries to gain the support of such a numerous and powerful body; for the intense *esprit de corps* which prevailed in the Janissaries, both in the corps and in each separate company, generally ensured the cause of the individual being made the cause of the corporation. Thus the body of Janissaries was by degrees converted from a military corps into a political party.

The Yamák tattooed the Nishán of the company he had selected upon his arm, and received a "Sofa Tazkira," or certificate of enlistment from the Captain. Ahmad Javád Páshá has given an example of one of these curious documents, which breathes a spirit of exalted fanaticism mixed with military pride. It announces after a long prologue that Muhammad Ataulla Effendi, son of Abdur Rahmán Bey, has placed his coat upon the sofa of the 19th Crta of Buluklis, and become their companion. It is sealed with a seal bearing the number 19 and a cypress tree, the device of the company, and is signed Sayyid Hasan Usta.

Under this reserve system, some of the most popular companies showed from three to four thousand men on their rolls at the time of the dissolution of the corps.

The ceremony of enlistment of a new recruit took place in presence of the assembled company. The statutes of the corps were read out to the recruit, and the oath of fidelity was administered; he was invested with the cap and coat of a Janissary, and the Oda Báshi gave him a hearty cuff as an earnest of discipline, at the same time hailing him as "Yoldásh" (comrade).

A Janissary might be dismissed from the corps, and his name struck off the rolls, for flagrant misconduct, or for non-appearance at musters. When a Janissary was publicly expelled from the corps, the strip of facing cloth which was worn on the collar of the coat was cut off in presence of the company.

When unfit for further service from age or infirmity, a Janissary was transferred to the Oturaks or sedentary establishment, and continued to draw pay and provision till his death.

The Janissaries were at first condemned to celibacy for life; but this rule, so repugnant to Musalman custom and habit, was not long enforced. When a Janissary obtained permission to marry, he was allowed to reside out of barracks, and resigned his right to rations. The men so excused generally became shopkeepers or artisans in the towns.

The sons of married Janissaries were early enlisted into their father's companies, and it is said that in the later days of the decay and corruption of the Ottoman military system, they were often entered on the rolls, and drew pay as Janissaries while still infants in arms.

The orphan sons of deceased Janissaries were rationed from the surplus rations of the company, and called Fazlakhwárán (crumb-eaters). When old enough they were entered into the corps of Recruit-boys (Ajam Oghláns).

Artillery (*Topjis*).—This was the first corps of artillery soldiers ever raised. It was formed in the first half of the fifteenth century, about a hundred years after the first institution of the Janissaries.

This corps was commanded by a Captain-General, called the Topji Báshi (Master Gunner). It was organized in companies or ortas, like the Janissaries, and the discipline, pay, rations, &c., were similar to those of the other corps of paid troops.

Ordnance Storekeepers (*Jebejis*).—This corps was commanded by a Captain-General, called the Jebeji Báshi (Head Storekeeper). It was organized in companies or ortas, the companies being separately numbered in two divisions, and called Jamá'ats and Bulúks respectively, as in the Janissaries.

The Jebejis had charge of the Arsenal (Jeba Khána) at Constantinople, and in all the great fortresses on the frontiers.

Their organization, pay, &c., was similar to that of the Janissaries, of whom they were close allies.

There was bad blood between the Topjis and Janissaries, and a standing feud between the latter and the Sipáhis, which sometimes even broke out on the battlefield, in face of the enemy, and often deluged the streets of Constantinople with blood.

Artillery Drivers (*Top Arábajis*).—This separate Corps of Drivers for the Artillery and Train was instituted very early among the Turks, another instance of the genius for military organization which distinguishes the early history of their nation, and which has so entirely deserted them in later times.

This corps mustered only a few hundred men, and was commanded by a Captain-General (Top Arábaji Báshi).

Bombardiers (*Khumpárajis*).—This corps was raised towards the end of the seventeenth century, when the Turks first became acquainted with the use of mortars (Khum-pára; lit. piece of a jar).

It was a separate corps from the Topjis (Gunners), and was commanded by an Officer, called Khumpáraji Báshi. Its strength was gradually raised from a few hundred to 2,000 men.

Sappers and Miners (*Laghúmjis*).—This corps also was formed at the latter end of the seventeenth century, when the Turkish arms were confronted by the skill of European engineers, trained in the school of Vauban and Cohorn. It was commanded by the Laghúmji Báshi. It never attained to any degree of efficiency, owing to the want of scientific education among the Turks.

All the above corps had their fixed headquarters at Constantinople, and their Captains-General were included among the Military Chiefs of the Porte, and had the right to present themselves at the Grand Vazir's levées. Their regulations and institutions conformed generally to those of the Janissaries.

Recruits (*Ajam Oghláns* or *Foreign Boys*).—This corps was established at the first institution of the Janissary Corps, to train and furnish recruits to the latter; and it subsequently supplied recruits to all the above-mentioned dismounted corps of paid troops.

Method of Recruiting.—The Ajam Oghláns were Christian boys

made captives in war, or children of R'áyás (Christian subjects of the Porte), taken as a human tribute from their parents. At periods of from five to seven years, Janissary pressgangs were organized throughout the Empire, under the supervision of two Major-Generals of the Corps, one for the European, and one for the Asiatic provinces. A pressgang, under the command of a Janissary Captain, visited all the towns and villages of each province, levying a tribute of every tenth male child on the Christian population.

The provincial Governors and Kádis assisted them in making the levy. The finest and stoutest boys, aged from twelve to fifteen, were chosen, and were driven like sheep to Constantinople, Adrianople, and Broussa, where they were formed into companies, and lodged in barracks like those of the Janissaries. They were circumcised, given Musalman names, and instructed in the faith and practice of Islám. They were practised in gymnastic and military exercises, and were employed during their novitiate as labourers on the Imperial estates, as hewers of wood and drawers of water for the Sultán's Seraglio, as workmen in the dockyards and arsenals, &c. Their novitiate or probation lasted seven years ordinarily, and then they were drafted into the different military corps.

The Bostánjis, or Sultán's Park Rangers, got the first pick of them; the Topjis (Artillery) had next choice; all that remained were enrolled in the Jebejis and the Janissaries.

Organization.—The Ajam Oghláns were organized in companies like the Janissaries; the number of the companies seems to have varied from time to time, for it is given very differently by different authors, some putting it as high as sixty, others as low as thirty. The companies were numbered on two lists, as Bulúks and Jamá'ats respectively. They were also divided into two brigades, Rúmili and Anatoli (European and Asiatic), according to the nationality of the boys.

The strength as well as the number of the companies is very variously given.

The companies do not appear to have had badges or flags.

Officers.—The corps of recruits was officered from the Janissaries. It was commanded by the Istambol Ághási (Constantinople Lord), who ranked next to the Lieutenant-General, and above the Major-Generals of the Corps of Janissaries.

The European and Asiatic Brigades of Recruits were commanded by two Officers, called respectively Rúmili Ághási and Anatoli Ághási.

These three General Officers were Captains of companies of Ajam Oghláns.

The Kul Oghli Básh Cháush (Provost of the Slave Children) was a Corps Adjutant.

Each company had three Officers.

1. The Chorbaji, or Captain. These were the junior Captains of the Corps of Janissaries, and were transferred according to seniority, as vacancies occurred, from "Ajami Yáyá Bashi"

(Captain of Recruits) to Kápu Yáyá Báshi (Captain of Janissaries).

2. The Maidán Kiáyá (Superintendent of Parade), the Lieutenant and Instructor of the company.
3. The Kápúji (Gate-keeper). This officer probably exercised the functions of a company serjeant-major.

There was a Secretary for the corps of Ajam Oghláns, who kept the registers and accounts.

Interior Economy.—The Ajam Oghláns received both pay and rations. In Constantinople they were lodged in a separate block of wooden barracks, called the Ajam Oghlán Kishlasi (recruits' winter quarters).

They were dressed in red pointed caps and red jackets with a cleft in the shoulder.

After the tribute-levy of Christian children was allowed to fall into disuse towards the end of the seventeenth century, the *raison d'être* of the Corps of Recruits ceased to exist, but it was still maintained, and was filled by the children of Janissaries, and by the enlistment of Musalman boys.

Water-carriers (*Sakkas*). This corps furnished water-carriers to every company of the paid troops, like the Bhistis and Puckallis who attend on our troops in India. These men were in each company commanded by a Sakka Báshi, who ranked with the Officers of the company, and was allowed to wear a beard.

In the Album of Plates issued with the 1st Book of Ahmad Javád Páshá's History, the Sakka is represented wearing a cap of peculiar shape, and a leathern jacket with a stamped pattern and metal ornaments on it.

The second category or unpaid troops constituted the great majority of the military forces of the State.

The bulk consisted of horsemen holding fiefs, or having their maintenance charged upon the land on condition of their rendering military service, divided into three classes:—

Sandjak Beys (lords of the standard).
Za'ims (holders of large fiefs).
Timárlis (holders of small fiefs).

The Mameluke Beys of Egypt ranked among the Sanja Beys of the Empire.

The Akinjis were horsemen who neither held fiefs nor drew pay; but who served for the plunder that they could obtain.

The Tartars of the Crimea served as auxiliary horse under their own regulations and commanders.

The Sárija (light horse) and Sagbáns (chasseurs) were the horse and foot guards of the Páshás, who paid them out of the provincial revenues.

The Dalis (madcaps) and Gunalis (hussars) were cavalry troops, distinguished by peculiarities of dress and equipment.

The Charkas were Circassian mercenaries, and the Maghrabis Moorish ones.

The Azabs (bachelors) formed the ruck of the Turkish irregular infantry. The Azab Agha was one of the military chiefs of the Porte.

The Levends were an irregular corps, which served as marines in the fleet. They were under the orders of the Kapitán Pasha (Lord High Admiral), and were the only description of troops in the Ottoman Empire among whom Christians were permitted to serve.

FOREIGN SECTION.

FRANCE AND HER MARINE (MERCANTILE AND WAR).[1]

By Contre-Amiral RÉVEILLÈRE; translated, by permission, from the "Marine Française," by Commander H. GARBETT, R.N.

"OVER two million frozen carcasses of sheep were imported into England from New Zealand during the year 1891; 340,000 were brought from Australia; 20,000 from the Falkland Islands; so that refrigerating chambers are destined to play an important *rôle* in the food supply of England."

A Cape merchant observed to Captain Trivier: "The recent votes of your Parliament go far to isolate you from Europe, and the time will come when you will work but little, except for yourselves."

These two sentences, taken from the "Bulletin de la Société Géographique de Bordeaux," mark, better than a long discourse would, the difference between the political economy of France and England.

England wishes that all the world should work for her, and to work for all the world. France intends to live on her own soil and from her own soil. She only wants to work for herself, and, above all, means that no one should work for her.

England encircles the globe in the network of her commerce. France wishes to live like Robinson Crusoe on his island.

For England, the ocean is an inexhaustible source of wealth. For France, the ocean has no existence.

At the risk of passing as an Anglomaniac and bad patriot, I consider that the political economy of France is the political economy of the past.

The development of our national greatness depends upon the extension of our marine, our industries, and our commerce, into all the markets of the globe. The construction of the Suez Canal inaugurated a new era in commercial relations and in naval construction. The consequences of this order of things will accentuate themselves more and more. The age of routine is passed; we must prepare our-

[1] The introductory portion of Admiral Réveillère's paper no doubt enters into questions which, taken by themselves, are quite foreign to the scope of this Journal. As, however, it furnishes the key-note to the rest of the paper, and contains ideas which are worthy of consideration in connection with the maintenance of, and the tie which should exist between, the navy and the mercantile marine of any powerful nation, it has, with the exception of one or two paragraphs, been reproduced in its entirety. Moreover, it would not be fair to the author, who has courteously given permission for the translation of his article, were all allusion to the politico-economic views, the exposition of which forms so important a part of his paper, to be entirely suppressed.—EDITOR.

selves to take full advantage of the field opened to our activity by the greatest work of the century.

The sea is an international domain. By the creation of regular services of mail boats, the commercial fleets of different countries become more and more the systems of national routes which the different States trace for themselves over the international domain.

Blind is he who does not see that we are marching on towards the internationalization of all the sails which are spread; the internationalization of capital, the internationalization of labour. Every nation is a unit of this association of the future: the association of races for the common exploitation of our planet.

But let no one deceive himself; internationalization supposes nationalities and rests upon nationality.

As the characteristic of progress is the increase of solidarity between men, every man, none the less, preserving his own personality; so the nations are destined to draw themselves closer together by a movement bound to bring about internationalization, without, however, becoming absorbed in one large community.

It is the ocean which renders possible this universal association; it is the "marine" which is the instrument of this association.

Territory is the personal property of each nation, the ocean is the common property of all, where all have the right to freely display their energy. For the man who comprehends the modern world, the earth is a universal market, to which all send their products by the ocean, which is the common route.

Then, what line of conduct shall we pursue? Free exchange, and the development of the great maritime companies. How shall we lose all the advantages of our geographical situation, which is unique in the world? By having adopted at the end of the nineteenth century the policy of Charles V, by which we run the risk of an effacement similar to that of Spain.

A maritime company can be assimilated to a railway company, the one or the other having the charge of serving a certain route. By subsidizing the maritime companies, the State does not overstep in a greater degree the rational powers which all economists allow it, than when it creates gratuitously a national route at the expense of the community.

The *régime* of the large companies is a democratic *régime*, because it substitutes for rich merchants a number of small capitalists.

One is able, again, to invoke in its favour the amelioration of the lot of the sailors. The private traders never will treat their personnel with so much justice as the companies. The most economical board of directors will never show the readiness of private traders to cut down the remuneration, the food, and the comforts of their men. Nobody expects to see stokers and seamen spending their days in luxury; the *rôle* of a sea life will always be hard; but everything is relative, and none will deny that the life of a sailor has been made much easier since the advent of large companies.

M. Cherbuliez said, truly, that the future belongs to those nations who rightly adapt the best of the doctrines of political economy; and

Stuart Mill did not exaggerate when he said, that "for national independence it is of importance that a nation should not remain too much behind in these matters."

* * * * *

Before the Great Revolution, our foreign commerce equalled that of England; why should we not regain our lost ground? The revolution was one of those crises through which nations, like men, pass before arriving at the adult age. When growth is too rapid, it is always accompanied by a temporary weakening of one or other of our principal organs. It is impossible to deny that our foreign commerce was profoundly affected by a state of things which placed France under the ban of Europe. Encircled by a coalition, she was reduced to live upon her own resources; private interests were thus created, opposed to exchange with foreigners. In order to trade, it is necessary to produce; but all the moral and physical forces of French society were consecrated to the absorbing work of the defence of the soil and of the national independence. During that time we lost the habit of producing for the foreigner, of exchanging with him; we lost our *clientèle*.

But it is, above all, to the wars of the Empire that our commercial decadence must be attributed. Whilst the Emperor followed his chimera of a continental blockade, England monopolized the commerce of the world. At the re-establishment of peace, the protectionist policy of the Restoration gave our commerce the *coup de grâce*.

Before the use of steam, the difficulties, the dangers of even making the land round our coasts, and the unnavigability of our rivers, constituted a serious obstacle to the development of our prosperity. To-day this obstacle has disappeared; with steam, our coasts have become accessible without much danger, and our railways compensate, in a measure, for the poorness of our waterways.

The material progress of a nation involves and necessitates more and more its dependence upon the entire world for its subsistence and its means of existence. No nation depends so much upon others as England, and that is why she is the richest; she rules and commands the universal market, because, in business, one depends only on others on the condition that they also depend on one's self; she is the most powerful because she is the richest, and because in our century, the European nations being nearly equal in intelligence and courage, wealth becomes a factor of colossal importance.

With Dunkirk, which overlooks the North Sea; with our Marseilles, queen of the Mediterranean, connected by the Suez Canal with India, the extreme East, Australia, and East Africa; with Havre, having such natural relations with North America; with Bordeaux, which, in addition to its commercial relations with North and South (principally South) America, has made a speciality of trade with the West Coast of Africa; with Nantes and Bordeaux ministering directly to the Atlantic, and (in a future more or less distant, but certain) directly also to the Pacific by Panama or Nicaragua, there is no commercial situation comparable to that of France. Her contact, by

her long frontier, with the European continent, although a source of great anxiety, is, nevertheless, a great advantage.

To be bounded by the Channel, Central Europe, the Mediterranean, and the ocean, is to find one's self in the very centre of the great vortex of business.

Spain, like ourselves, is bordered both by the ocean and the Mediterranean, but she has the misfortune of being isolated from Europe, and at a distance from that enormous consumer, England. In spite of her geographical position, the debility from which she suffers is due to her deplorable system of protection, the first cause of her ruin.

If the Englishman is in a supreme degree a disagreeable neighbour, the nearness of Great Britain places under our hands a market without limit. Let us never forget that England is our best outlet.

In consequence of our geographical situation, we can, if we so will, draw to ourselves almost all the traffic of the two Americas with the Continent of Europe. But it is necessary that our basins and docks should be properly organized and fully equipped for loading and discharging, and our coasting trade must be developed, so as to feed the ports of entry for the American trade, and similarly distribute to the European ports the products brought across the Atlantic.

I wish we could impress these truths upon ourselves:—

1. That the position of France destines her to be the great *entrepôt* of Europe.
2. That by developing coasting trades we shall feed our ocean trade.

It was in recognition of her true *rôle* that France devoted herself to those great enterprises, the opening of the Suez Canal and the piercing of the Isthmus of Panama. Without doubt the check at Panama is lamentable, but in that unfortunate affair the country none the less obeyed the first view of her destiny.

If Panama is a scandal for some, and a great disaster, Suez, on the other hand, is a great national victory. In working for herself there, France worked for humanity. We may observe that one of the beautiful laws of political economy is, that no one under the *régime* of exchange and liberty is able to work for himself without rendering to others a great service.

The examples of Suez and Panama corroborate this consolatory social law—that the effects of evil are transient, and the consequences of good permanent.

Without doubt the blow at Panama has embarrassed many, and plunged many more into misery and despair. A sufficient number of French people suffer then from the breaking up of that noble enterprise; in six years no one will speak of it; while, as long as the world exists, humanity will reap benefit from Suez.

In order to resolutely tackle them, we must grasp the consequences of the economic revolution inaugurated by the advent of the oceanic epoch, an inauguration to which France so brilliantly contributed by the opening of Suez.

A new order of things is at hand; our narrow economical prejudices now, as of old, constitute a national peril.

The opening of Suez and the partial cutting through of the Isthmus of Panama, by inaugurating the oceanic epoch, compel us, under penalty of seeing ourselves erased from among the great maritime powers:—

1. To a frank entry into the road of free exchange.
2. To the development of our coasting trade by the transformation of the Canal du Midi into the Canal des Deux Mers for the benefit of our coasters.
3. To the creation of a large roadstead at the entrance of the Seine, and the deepening of the river.
4. To the development of the great ocean routes converging on our ports, for the term "ocean routes" is admirably suitable to our great lines of mail-boats.

The country where the largest number of these routes converge will be the most prosperous by its industry and its commerce. The flag which the most rapidly and the most economically performs its transport duties will have the advantage over all the others.

It is necessary to excite in ourselves the love of great enterprises, or, to put it better, not to shackle ourselves by the education of another age. The substitution of the study of living languages for that of languages so justly termed the "dead," is the first step to take.

Our ignorance of living languages is one of the greatest obstacles to the development of our commerce. The heads of our industries ought to visit the countries with which they wish to enter into relations; they should dispatch travellers, and have employés who can correspond in the language of the countries with which they are transacting business.

It is of importance to have very good men to command the ships of our great lines. It is right that it should be so.

In order to maintain this level, or even to raise it, it will be necessary to give these Commanders a higher position. Captains commanding our large mail-boats, that is to say, some of the finest vessels in the world, are only on the same footing as "Enseignes de Vaisseaux" or Lieutenants in the Army. There is no sense in this assimilation. The Commanders of the ships of our great lines ought to have rank which accords with their responsibilities; whether they come from the navy or the mercantile marine, they ought to rank with "Chef de Bataillon."

Premiums on speed will advantageously replace the present premiums. In the distribution of the present premiums the qualities of a ship are not taken into account; whether she is well or badly constructed, whether she is behind the times or in advance, whether she is an old dummy or an ingenious application of a new idea, we blindly subsidize for tonnage.

We encourage the building of wooden sailing ships—that is to subsidize the "diligences;" it is hostile to progress. The protective system is the protector of routine.

Of all the qualities of a ship, the most easy to fix—and that mathematically—is speed. The subsidizing of tonnage is the consecration of routine; the subsidizing of speed is progress.

Let us insist on this economical truth—one of the highest importance: the speed of ships has the precious faculty of multiplying the productiveness of floating capital; it is, consequently, one of the most powerful elements which make for wealth.

In order to profit by her marvellous commercial situation, France must create a magnificent set of tools for the work. We believe in this necessity from the point of view of her prosperity; we believe in it still more from the point of view of her security.

If we enter on this path, the maritime companies, at the moment of the declaration of war, will hold at our disposal the most valuable means of action, both as regards personnel and matériel, which will permit us, in the shortest possible time, to equip a fleet of cruisers carrying a supply of coal so ample that they will be able to keep the sea for an indefinite time.

Any one can understand the importance of constituting a commercial navy composed of swift ships in order to have under our hand in time of war ships capable of cruising and forming blockades.

Without doubt, we have first to turn our attention to the East and devote all our care to the organization and mobilization of our land forces. But it is time also to turn our thoughts to the organization, mobilization, and development of our naval forces; the Italian navy is menacing; the German navy growing with rapid strides.

The transport by sea at short notice of an imposing army ought to be considered as one of our chief aims. This transport is only possible with the assistance of the powerful maritime companies. Consequently, in the interest of the army, putting aside economic grounds, we ought to encourage, as much as possible, the great maritime companies.

It is in premiums on speed that we ought to expend our subsidies to the merchant marine; it is speed that we ought to encourage before all, and at any price. Money thus expended will assure to our mercantile fleet a superiority in the region of trade, and place at our disposal, in case of war, the means for acting in the most energetic manner, both by land, by the transport of troops, and also at sea.

I say both by land and sea, because, save against Germany, the rapid carrying at sea of a large force will be one of the most certain elements of success. Against Germany, a prompt transport of troops by sea might be decisive, if, as will not be impossible, we have Denmark as an ally. It would cause Germany some trouble if a *corps d'armée* were suddenly disembarked in Denmark.

Suppose, for an instant, Denmark reinforced by us, the German coasts disquieted by the confederated squadrons of France, Denmark, and Russia, blockaded by our cruisers supported by these squadrons, continuously menaced at all points where a disembarkation could be effected.

All this is pure hypothesis, more or less chimerical, but none the

less it points out the *rôle* which our maritime companies will certainly be called upon to play in war.

The Transatlantic Company possesses ships worth eight millions, some of them 400 feet long, steaming 20 knots. Some ships of this company have made the passage between New York and St. Nazaire at a mean speed of 18 knots.

These are facts of capital importance: we are in face of a true revolution.

A new "marine" has been formed to respond to the new needs of our great industries. Ancient customs, old habits, antique rules, all must be remoulded and placed in harmony with a very different order of things.

Has not the moment come for the reformers to study the concerns of the mercantile marine as well as those of the fighting navy?

The services rendered by the maritime companies in the war with China and Tonquin were inestimable. In order to appreciate their work, it is necessary to have seen it, as I did. Without the assistance of the great companies for the transport of personnel and matériel, our war in the East would have had a deplorable issue. However little important the war in Dahomey may be, we nevertheless see there the important *rôle* the companies are playing in that expedition.

France beyond the seas has extended herself of late in a singular manner. With the considerable interests which we have, rightly or wrongly, created in the India and China Seas, in Madagascar, and on the West Coast of Africa, with the development which we are struggling to give to our foreign relations, the national importance of the maritime companies grows day by day. We establish commercial routes by means of lines of mail-boats, which cost a good deal; but, in placing them gratuitously at the service of the public, we believe that the country does good business. We subsidize the railways for the same reason. The mail-boat is the railway of the ocean. The lines of mail-steamers are at this time one of the most important elements of the national property in time of peace, and of military power in time of war.

I will now turn to another branch of this subject.

The distribution and organization of our fleet ought evidently to be arranged in view of the probabilities of war.

What are the wars we have to prepare for? What is the most probable war? What should be the *rôle* of the navy and of our commercial marine in particular under different circumstances?

Beginning with the least probable, the wars to be prepared for are (1) against England; (2) against Italy; (3) against Germany; and (4) against the Triple Alliance.

I do not hesitate to regard a war between France and England as one of the most terrible evils which could be inflicted on humanity. An equal duel would be interminable. The two nations could work each other a prodigious amount of ill; neither could sufficiently gain the upper hand to be in a position to make the other sue for peace. While impotent to destroy each other, there is every facility for

injuring. Both, moreover, will have much to lose in such a struggle, and neither has anything to gain. Thus, in spite of continual disagreement, in spite of a secular antipathy, they support each other, feeling bound by common interests.

In order to beat England, it is necessary to become undisputed master of the sea; this is beyond our power. England, on her side, to conquer us, must possess an army of invasion, of which as yet she has not the first soldier.

No one of any sense will dream of seeing us sufficiently masters of the Channel to be able to effect an invasion or of being able to revictual an army if disembarked. To suppose that we can sufficiently blockade the English coasts to reduce the country by famine by preventing the importation of food supplies, either by her own or neutral ships, is an idea which would never enter into the head of a sane man.

We, on our part, cannot be blockaded. If it is a guarantee of safety to be an island, it is also a weakness.

Supposing our coasts ravaged, our ports blockaded, we shall none the less continue connected with all Europe by our railways, and with the whole world by means of Belgium and Spain. Our European commerce is in no way hampered; our commerce with other parts of the world is carried on by neutrals. It is a considerable inconvenience, an incontestable source of impoverishment; but this *régime*, all debilitating as it may be, enables us to remain indefinitely without our national existence being imperilled.

If our enemy should take possession of our Colonies, it would be a very hard blow for our *amour-propre* and our prestige, but a great relief for our finances. Our neighbour across the Channel can then do us a good deal of harm, but he cannot compel us to sue for grace. On our side we have cruiser warfare, the importance of which it is not necessary to exaggerate, although, on the other hand, it is not to to be disparaged. The "Jeune École" certainly deceive themselves as to the importance of this kind of struggle, when they imagine that they will condemn England to perish of inanition by the use of torpedo-boats in the Channel and some fast cruisers; although for us this is the true method of fighting her.

We know, moreover, that the "Jeune École" profess a profound disdain for International Law, and care little for neutrals. However, if we have war with England, the moment will be a bad one for picking quarrels with other people. Supposing that we could completely paralyze the commercial navy of Great Britain (and that can scarcely be hoped for), we could never pretend to hinder her by an effective blockade from provisioning herself and exporting her goods by means of neutrals.

The idea of the "Jeune École," although exaggerated—we repeat it—is none the less the right one.

If we cannot starve out England, we can nevertheless make her suffer the pangs of scarcity.

In the first place, our north and north-west coasts play a *rôle* of a certain importance in the feeding of our neighbour. The interrup-

tion of commercial relations with us will be for her a first cause of annoyance; it will not be a matter of indifference to her to be deprived of our agricultural produce. Without doubt, this deprivation of exchange will be prejudicial to our own coast population; they will suffer heavy losses, but it is one thing to be deprived of the accessories and conveniences of life, and another to be deprived of the necessaries of life.

The "Jeune École" base their theory upon one certain fact, the impossibility of England supporting herself from her own soil. Consequently a serious attack on her commerce would be for her a matter of more importance than the ruin of our navy would be for us. They are therefore right in asserting that war against England ought to be carried on by means of rapid cruisers.

Our arm against England ought to be speed.

With fast ships, carrying guns throwing shells of great capacity, we could keep her coasts under a perpetual menace of bombardment. Her heavy ironclads could not protect them. The greater the speed of our ships, the greater will be our chances of success. Every fast merchant steamer ought to be promptly transformed into a cruiser.

The "Jeune École" are right, a hundred times over, when they maintain that against England speed is everything.

In such a struggle, the relative paucity of our maritime commerce becomes an advantage. A French cruiser has ten times more chances of meeting an English merchant ship than an English cruiser has of meeting one of ours. The paralyzing of our sea-trade would have no such baneful consequences for us as it would have for England.

All our fast merchant ships should be utilized, the small ones cruising in the Channel or off the Irish Sea, the large ones on the equator. Of course, a large number will be captured. We must have no illusions on that point; it does not matter, we shall none the less make life singularly disagreeable on the other side of the Channel.

But why should we enter into a conflict with our neighbour? She is far too practical to seek one. After a calculation of profits and losses, she will conclude for peace. As for us, if, while the foreigner remains camped on our soil, we should seek a quarrel with our rival, it would be an infamy.

I love to disabuse people of the idea of a sterile struggle between the two most liberal nations of Europe, a struggle of which despotism alone would reap the advantage. I prefer to repeat the words attributed, rightly or wrongly, to Admiral Lord Clanwilliam, in an interview with a reporter: "Remember that, in face of a close union between the English and French Fleets, no one will dare to stir in Europe."

We can damage England—

1. By preventing her merchant ships fetching their ports by means of small ships of high speed; by stationing torpilleurs and aviso-mortar-vessels at Brest and in the Channel, and by launching them from our ports, making them, when pursued, take refuge in the numerous bays of our coast.

2. By keeping the English ports and coasts under a continual menace of bombardment by means of aviso-mortar-vessels.
3. By cutting the commercial communications of Great Britain with Suez, by means of cruisers and torpilleurs stationed on the coasts of Provence and Algeria, specially at Villefranche, Corsica, and Biserta.

The English battle-ships could not thwart us very much in this work; they would have enough to do at night time in guarding themselves against the attacks of our torpedo-boats.

We may not be able to dominate the Mediterranean, but we can render the domination of our rivals sterile; we can close to commerce the gate of the eastern basin of the Mediterranean, and render the possession of Suez useless by guarding the Villefranche-Corsica and Biserta line.

4. By means of our submarine torpedo-boats carrying panclastite, we can play our enemy some very bad turns in our roadsteads and off the entrance to our harbours.
5. By converting all our fast merchant steamers into cruisers.

Shells of large capacity can reduce to nothing all the protections hitherto devised; every merchant ship therefore should make a good cruiser.

On our side we should have to maintain the communications between the coasts of France and Algeria, and as it is to be feared that England would make herself very troublesome in the French sea (comprised between Provence and Algeria), we may be obliged in a measure to effect this by means of blockade-runners.

In order to utilize then all the resources which offer in a war against England, our mercantile marine must be composed of very fast ships. No ship of low speed could be used in time of war; she would belong in advance to the enemy.

The war against Italy will be an entirely maritime one. Whichever of the two nations remains mistress of the sea will assuredly conquer the other. This opinion ought to be as widely held in France as it is in Italy. If we lose the maritime supremacy, Italy will raise against us the Mussulmans of Africa. She will feed the revolt with arms and munitions; she will even give troops to assist, and these, however few they are, supported by the Arabs, will place us in a cruel situation. Masters of the sea, we shall have a good chance of putting Sardinia as in a vice between Corsica and Tunis.

If our navy can take possession of the sea comprised between Italy and Tunis, after having cleared the coast judged most favourable, it would be able to make preparations for a landing.

Such an operation would have to be carried out with great speed. Directly the shore is swept by the guns of the ships, an important body of troops must be in readiness to be thrown on shore. This can only be done with the aid of a numerous mercantile marine, on which will also devolve, in addition, the work of provisioning the army and conveying men, munitions, and matériel.

Italy is a kingdom composed of islands and a large peninsula; will not therefore a war against such a country be essentially a maritime one?

In order to bring it to a satisfactory conclusion, the struggle at sea ought to be crowned by a disembarkation; and without a numerous mercantile marine no disembarkation is possible.

If France and Germany find themselves single-handed face to face, the navy will only play, relatively speaking, a secondary part. In 1871 this eventuality seemed most probable, so at that time, with some appearance of reason, the navy was neglected. In a certain measure this negligence is not much to be regretted; activity in the building yards at the time would only have served to increase the old hulks with which our arsenals are encumbered.

The absorbing question was then rightly the defence of the frontier. But everything has been changed in consequence of the extraordinary development of the German navy.

At the frontier, the struggle might last some time between two adversaries of equal force, both staking their existence in a duel to the death.

It will then be of some importance to paralyze the German trade, which is now considerable. Here, again, to attack their merchant ships we must use our armed mail steamers, and the large quantity of coal they can carry places them in a very advantageous position.

In a cruiser war against Germany, we have the very valuable advantage of possessing almost everywhere a few places where our auxiliary cruisers can renew their supplies of coals, munitions, &c.

Between Dakar, for instance, and the Salut Islands, off Guiana, it will be easy for us to échelon a line of cruisers intercepting the German commercial routes, the access from the South Atlantic, from the Pacific and East Indies.

It is easy to understand then how important, perhaps decisive, will be the *rôle* of our "marine" in a war against the Triple Alliance, whether it be keeping Italy on the *qui vive* about her coasts, or, in the Baltic, compelling Germany to keep an army corps in readiness to resist an invasion from the sea, and cutting her off from all foreign communications by a rigorous blockade; a double object by no means chimerical, if we have the assistance of Russia and Denmark.

Vanquished on the sea, our situation will be deplorable. In what position shall we be to treat, even if conquerors on the Rhine, with our coasts bombarded from Dunkirk to Havre and from Cette to Mentone, with Algeria in revolt, and Corsica in the hands of Italy?

Since the advent of the Triple Alliance and the Franco-Russian *entente*, the naval forces have assumed an importance which was not the case previously, and this for two principal reasons:—

1. War with Italy ought to be, and will be, essentially a maritime one.
2. With the aid of Russia, and especially if Denmark joins our alliance, the Franco-Russian Fleet will play a preponderating *rôle* in the Baltic.

Then, the stronger we shall be on the sea, the more reason we shall have for hoping for the neutrality of England.

The defence of our coasts and of the honour of our flag is a work sufficiently grave to completely employ one Minister. The Ministries of the Navy and the Colonies must be separated, and the creation of a Minister for the Colonies alone has become a necessity. We believe firmly in the urgency of creating a Minister for the Colonies, who will dispose of a colonial army and navy. We shall have to accept the opinion of Gambetta, and copy the colonial methods of Holland, a small country, which has possessed for a long time a vast colonial territory, and where, as the result of long experience, the colonial army is quite distinct from the home. The Netherlands colonial Ministry has a river fleet entirely at the disposal of the colonial Government. The Military School is similarly divided into two, and the officers of the two armies undergo quite different training, the one preparing themselves for a European war, the others studying the history, manners, geography of Java, Sumatra, &c.

The Minister of Marine will then have for his duties—

1. The organization and maintenance of the Fleet.
2. The defence of the coasts.
3. The organization and mobilization of a mixed naval force, that is to say, of that portion of the commercial marine which is capable of being utilized in time of war.

France can only devote to her navy a fraction of her resources—the problem to be solved is how best to use a given budget. If money is devoted to ships of only a secondary value, there will remain nothing for building first-class vessels; and it is for this reason we formulate our demand for the creation of a mixed marine.

We should prefer to see the merchant navy in the hands of the Minister of Commerce, who should be given a completely free hand in his administration. We consider that the Minister of Marine should only have the sufficiently onerous duty of seeing that our flag floats honourably on the ocean, and of defending our coasts.

Without insisting on the commercial marine being placed under the Minister of Commerce, we would have three navies recognized:—

1. The commercial marine, properly so called, attached either to the Ministry of Commerce or the Ministry of Marine.
2. The war navy.
3. The mixed marine.

The merchant ships admitted into the "mixed marine" will have to comply with certain conditions laid down in the contract. They will receive a subsidy proportioned to the exigencies of the State. In time of war, they will be requisitioned, both personnel and matériel, by a simple Decree.

The "mixed marine" will be divided naturally into two branches: 1st, cruisers; 2nd, transports.

The transports themselves will be divided into two categories: 1st, transports of "personnel"; 2nd, transports of "matériel." All

the ships will receive a premium in respect of their speed. No ships below a certain speed will be admitted into the "marine mixte."

The General Staff of the Navy will classify the ships into three categories, according to their speed:—1st, cruisers; 2nd, transports of personnel; 3rd, transports of matériel.

Ships qualified as cruisers will be fitted to carry guns. In addition to the premium for speed, they will receive a subsidy in proportion to the number of guns they can carry. Thus, on declaration of war, both auxiliary cruisers and transport will be there ready to hand, with nothing to be done except putting the guns on board with a certain proportion of gunners of the Naval Reserve.

The fighting navy at the moment of the declaration of war will be divided into two categories:—1st, the regular fighting navy of battle-ships, cruisers, torpilleurs, &c.; 2nd, the auxiliary cruisers.

The auxiliary cruisers will be commanded by their Captains of the mercantile marine, and manned by officers and crews sent on board on the declaration of war. They will receive a reinforcement of gunners from the Reserve, commanded, according to the importance of the detachment, by a Sub-Lieutenant or Lieutenant, or by both, who will be exclusively charged with the military direction under the authority of the Commander of the ship.

To sum up:

From the point of view of the national defence, even more than from an economic point of view, the great maritime companies cannot receive too much encouragement.

From the point of view of the same interests, it is necessary to stop the present system of subsidizing according to tonnage. The coefficient of subsidy ought to be for tonnage and speed.

Subsidizing tonnage alone is the consecration of routine.

Subsidizing speed is the encouragement of progress.

FIG. 8.

WATER GAUGE WITH AUTOMATIC SHUT OFF COCKS.

Morison Type.

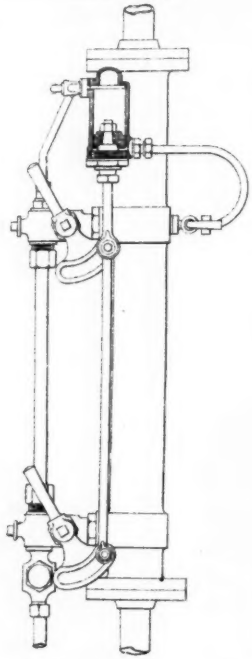
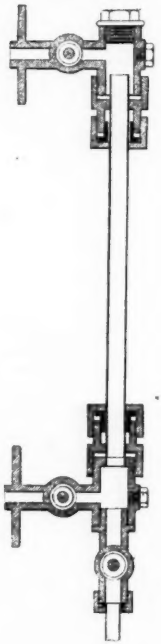


FIG. 9.

WATER GAUGE WITH GLANDS FOR DISMOUNTING.

Chanstangla Type.



FI

SUCTION CHAMBER FOR FEED

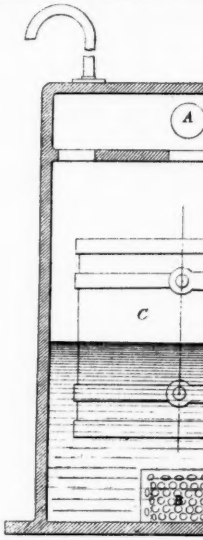
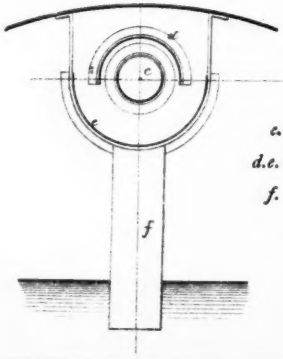


FIG. 10.

GUARD PLATES FOR INTERNAL STEAM PIPES.



c. Internal Steam Pipes.

d.e. Thin Plate Guards.

f. Tubes for returning the deposited water.

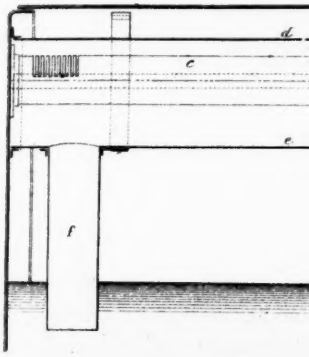


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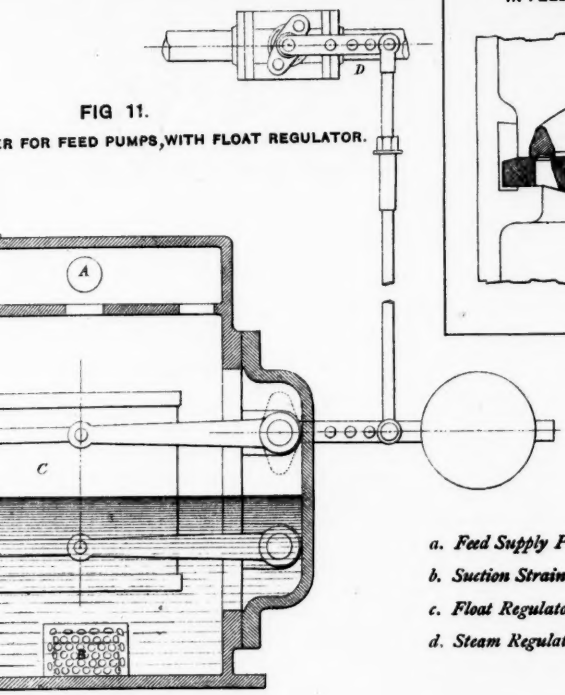
FIG 11.

R FOR FEED PUMPS, WITH FLOAT REGULATOR.



a. Feed Supply Pipe.

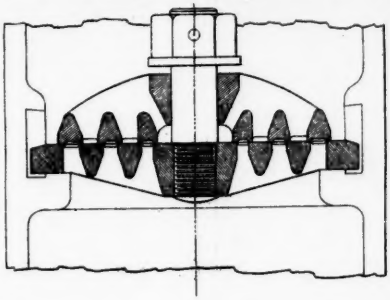
b. Suction Strainer.

c. Float Regulator.

d. Steam Regulating Valve to Pumping Engine.

FIG. 12.

POLY-ANNULAR VALVE, MAUDSLAY TYPE.
IN FEED PUMPS OF THE "RE-UMBERTO."



PES.

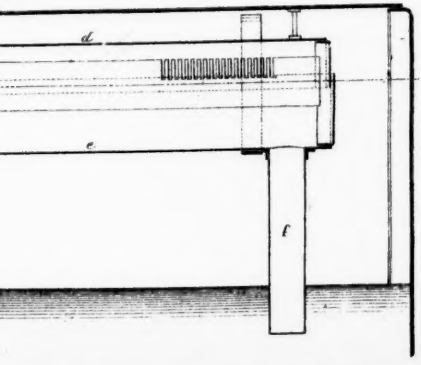
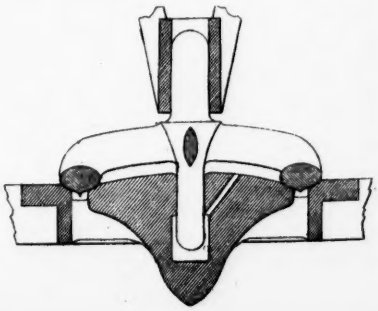


FIG. 13.

MONO-ANNULAR VALVE FOR FEED PUMPS,
RISBEC TYPE.



RISON & SONS, LITH. ST. MARTINS LANE, W.C.

RECENT PROGRESS IN MARINE MACHINERY.

By NABOR SOLIANI.

(Translated from the "Rivista Marittima" for September, 1892, by T. J. HADDY, R.N.)

(*Continued from No.* 179.)

Belleville Boilers.—These boilers have had a lengthened trial in France both in the navy and mercantile marine, and their use is extending in consequence of the persevering efforts which have been made to eliminate their defects. For this reason it appears to me advisable to give a more extended notice of them. The more recent Belleville boilers, some idea of which is given in Fig. 5 (*see* No. 179), are composed essentially of a collection of straight tubes, T, slightly inclined, forming a series of serpentine zig-zags, rising from a horizontal water chamber, A, below, and finishing above in another horizontal steam chamber or dome, V. This is supported above a furnace of refractory bricks, and the whole is inclosed in an envelope, I, of thin sheet iron and non-conducting material. The steam chest, V, is furnished with a special diaphragm for the purpose of separating the water from the steam, and preventing its passage into the steam pipe. The feed pipe is let into the steam chamber, where it is at once heated to the boiling point, and parts with any salts it may contain, which descend with it into a receptacle where they are deposited, and the water thus purified passes into the water chamber, A. The impurities which have been collected in the receptacle for the sediment can be discharged overboard by means of a valve. An auxiliary and necessary fitting for these boilers is the automatic feed regulator, by which the water level is maintained constant in the boiler, and by which also the degree of humidity of the steam can be regulated. This is a species of tubular column, which connects the steam chamber, V, with the water chamber, A, containing a float and system of levers in connection with it, which vary the opening of the feed regulating valve in accordance with the fluctuations in the water level; springs and counter-balance weights are fitted to modify the action of the regulator, and, although it is complicated, it acts very satisfactorily. The tubes proper are of iron; they are screwed in pairs into connecting boxes of malleable cast iron or steel, which form the elbows of the serpentines. The hold of the tubes is secured by screwing them into their connections, and opposite each tube is a hole closed by a plug, by means of which the tube can be examined and cleaned internally. The tubes have an external diameter of 100 mm.; the upper rows are 6 mm. thick; the two lower, which are most exposed to the action of the fire, are 10 mm. in thickness. In the work, "Les Machines Marines," by M. A. Bienaymé, from which I have taken

the preceding remarks, the following data relating to the boilers of the cruiser "Milan" are given. This ship has engines of 3,880 I.H.P.; at the trials 4,130 I.H.P. were developed, supplied by twelve Belleville boilers, each of which has the following dimensions and proportions:—

Area of grate	2·88 sq. m.
Heating surfaces	84·59 „
Weight without water	12·42 tons.
„ of water	13·42 „
Area occupied	4·26 sq. m.
Volume.....	15·00 cub. m.

The advantages and defects of the Belleville boiler are summarized in an excellent article published in the Journal of the R.U.S.I., for January, 1891, translated from the Russian by Major J. W. Murray, R.A. The principal conclusions to which the author arrives as regards the application to ships with engines of at least 2,000 I.H.P. are the following:—

1. The Belleville boilers with their accessories cannot possibly occupy in the direction of the length of the ship a less space than is necessary for ordinary cylindrical boilers; on the contrary, if they are placed in the manner most convenient for service, in pairs back to back, they occupy 6 per cent. more space.

2. With the Belleville boilers there is more space at the sides for the coal boxes, which may be increased in capacity about 10 per cent., but this advantage is only apparent, as they do not utilize the heat so well as the ordinary type.

3. The Belleville weigh about 30 to 40 per cent. less than the ordinary cylindrical boilers.

4. The action of the Belleville, on the whole, is satisfactory even for long voyages.

5. They require distilled water exclusively, and the quantity of fresh water required for feed is about 3 tons per 1,000 H.P. for every 24 hours. Sea-water cannot be used except in cases of extreme necessity.

6. When fed with distilled water, the Belleville boiler only requires to be cleaned after one month of continual work, but, if sea-water is used, the tubes are inevitably burned after a few days' use.

7. Under equal conditions, the Belleville boiler consumes about 10 per cent. more fuel than the ordinary cylindrical boiler.

8. Deposits are formed in the tubes when fires are lighted, and under steam pressure, which are very injurious and destructive to them.

9. When these boilers are fitted to ships for three or four years' commission, it is necessary to furnish a complete set of spare parts requiring renewal, in the proportion of about 12 per cent.

10. The boiler, when new, may last without repairs for four years if sea-water is not used, but after this time the tubes should be gradually renewed, and the whole renewed after six years in this way. This can be done without detaching the ship from active service.

11. The boiler thus renewed may last another four or six years, but after twelve years' service the whole boiler is so defective as to require to be replaced by new, with all fittings.

12. The decay of the tubes takes place by corrosion in the upper tubes, and by the action of the fire on the lower. The corrosion is internal, and more marked in the lower half of the tubes.

13. The first cost of the Belleville is 10 per cent. more than the ordinary boiler, and the cost of repairs during the first twelve years is about 50 per cent. of the first cost. It is, however, not necessary to remove the decks of the ships either for repair or renewal of the boilers.

14. During the life of the boiler it is not necessary to reduce the working pressure.

15. These boilers work with scarcely the tenth part of the water contained in the ordinary cylindrical boiler, and consequently the damage in case of explosion is proportionately less, and unattended with any risk of the loss of the ship.

16. The utmost care is required in their construction, both as to choice of material and workmanship, as the efficiency of these boilers depends very much on the perfection with which they are constructed.

With regard to the weight and volume of the Belleville boiler, I think it is well to make a few observations. The complete boiler weighs about 4,660 kilos. per sq. m. of grate, and about 160 kilos. per sq. m. of heating surface. From this point of view they weigh therefore much less than the ordinary cylindrical boilers, which weigh about 7,260 kilos. per sq. m. of grate, and about 290 per sq. m. of heating surface. Also with regard to the power, if applied under similar conditions, the Belleville boiler will be the lighter if worked under natural draught; but this is not the case if compared under conditions of forced draught, as the Belleville boiler cannot be forced like the ordinary boiler, in consequence of the tendency of the lower tubes to become injured by the fire, and for the products of combustion to become ignited in the funnel when the fires are much forced. In fact, on board French ships in which these boilers are fitted, the increase of power available does not exceed by 20 per cent. that of natural draught. For example, in the case of the "Piemonte," with engines of 12,000 H.P., developed by only four double-ended boilers of a total weight of 400 tons, it would require if Belleville boilers were used about twenty-four of them, giving a natural draught power of 10,000 H.P. and weighing also about 400 tons. With respect to the area occupied, the comparison would not be favourable to the Belleville type, which with the space for the firemen would occupy at least an area of 240 sq. m., while the four cylindrical boilers of the "Piemonte" occupy a little over 200. The capacity of the boiler rooms in both cases would be as nearly as possible the same. The comparison with the locomotive type of marine boiler is just as unfavourable to the Belleville; as, for example, in the case of the "Partenope," with four boilers weighing in all 100 tons, a power of 4,200 H.P. is developed, and for the same power it would be necessary to replace them with eight Belleville boilers, weighing in all about

120 tons; the volumes of the boiler rooms would be equal in both cases. On the whole, it appears to me that the only advantage for use on board ships which the Belleville boiler possesses is that it can be removed and renewed without opening up the decks; but, considering that the ordinary boilers on board war-ships last longer than twelve years, this advantage appears a very slight one to place against all the inconveniences attending the use of the Belleville type, first of which is the large number of these boilers which are necessary. To this it may be added that the more recent water-tube boilers, while retaining all the advantages of the Belleville boiler, are far more powerful, lighter, and less cumbersome.

Construction of Boiler Fittings and Accessories.—Water Gauges.—In modern boilers the water gauge glasses being at a much higher level generally from the use of large boilers of the return tube type, and in consequence of the high pressures now employed, the rupture of a gauge glass is attended with more serious consequences than formerly, and in order to obviate them many ingenious devices have been proposed. One of these is shown in Fig. 8, which is a recent invention, by which the gauge cocks are closed automatically at the required instant by means of a small steam cylinder and piston. This apparatus and the principal conections being all visible from the platform, any defect in its action can be at once detected and remedied; it has the defect that it is not very simple, and adds to the number of details which have to be watched and attended to. For these reasons, in our navy it is preferred to make the gauge cocks accessible by bringing the rods for working them by hand down to a convenient position. It would be still better, however, to prevent the rupture of the gauge glasses, and this desideratum may be obtained by the rectangular form of gauge having two faces only, formed of stout glass plate, fixed to a metal box. The "Chanst-angla" system, shown in Fig. 9, in which the glass is fixed in a double gland at top and bottom, is worthy of notice, as it permits of the broken glass being removed, renewed, and replaced conveniently.

Small Valves, Discharge Valves, &c.—The use of asbestos-packed valves is now becoming general for discharge valves and all other small valves in connection with the boilers and steam pipes, &c., subject to the boiler pressure.

Boiler Steam-stop Valves.—These are now always fitted so as to be self-closing in case the pressure in the boiler to which they are attached should fall below the pressure in the steam pipe from any cause, and so isolate this boiler from the remainder. They are always fitted horizontally to prevent vibrations and hammering on the valve seat, and with an external index and graduated scale to show the amount of opening, as also with a projecting spindle by which the valve can be turned round on its seating. In order to be able to close these valves from a position of security in the event of serious accident to one of the boilers, it has been proposed to fit connections so that this could be done from the deck above, but this arrangement is discountenanced by many, and I think with reason. In the first place

there is a possibility of the valves being wrongly or inopportunely closed from the deck, causing much inconvenience below, and the necessity of fitting these working levers so that they can be disconnected from those below gives rise to complications by no means slight. In the second place, it may be added that the arrangement would be of no use in the case of accident to the boiler proper, and accidents which may happen to the engines, &c., can be provided against in some other way. The deck fittings might be of use in the case of serious accident to the steam pipes between the boiler and engine rooms, but in this case probably the steam would invade the deck above, and render the operation of closing the valves even from this position either dangerous or impossible. It would, then, appear to be the best policy to render accidents to the steam pipes very improbable or impossible, by making them either of steel or, if of copper, by serving them over with copper wire, and by furnishing them with proper expansion couplings and tie rods to prevent strains due to the changes of temperature. Steam-stop valves in war-ships are generally made of gun-metal. Valve boxes of cast steel have latterly been introduced for these fittings, and apparently with advantage from the point of view of the expense, but small castings of bronze have as yet proved more reliable than those of steel, and the former metal for this reason will maintain the preference for some time longer which has been accorded to it hitherto.

Internal Steam Pipes and Guard Plates to prevent priming.—In order to extend the collection of steam over the area of the steam space in the boiler, the forked system of internal steam pipe has been applied by many engineers. This disposition would appear to be advantageous, but in our navy has only been tried in the boilers of the battleship "Morosini," which are liable to prime. A more efficient plan is shown in Fig. 10, in which the internal steam pipe is enclosed by semicircular upper and lower guard plates, with ample discharging tubes in the lower plate, for the return of the separated water. Guard plates, fitted at the water level, are also very efficient in this respect when fitted where the ebullition is most violent, that is, above the combustion chambers; and they have been applied with great advantage to the boilers of the "Vesuvio" and "Morosini."

Furnace and Ash-pit Fittings.—I have treated already of the means employed to prevent accidents from leaky tubes, and although sudden and violent leaks are not so much to be feared in future, still I think it may be useful to make a few remarks on some of the means employed to minimize the risk from them, since they have been fitted in some of our ships of recent construction. The furnace doors are made self-closing, on the "Martin" system or one very similar, while the ash-pit doors are simply balanced to admit the air by taking up an angular position when open, and closing in a vertical position against any current of gas tending to escape into the stoke-hold. It would appear to be advisable that the furnace doors should be furnished with an arrangement of holes other than those usually fitted, by means of which the supply of air above the furnace bars could be regulated, a larger supply being required immediately after

firing up; this is now generally obtained by leaving the door slightly open for a short time. Ash-pans are fitted to the ash-pits for collecting the ashes, and small cocks and water cooling pipes are fitted to keep these ash-pans supplied with water; the vapour thus formed by the hot ashes passing through the furnace bars with the air appears to favour combustion; this fact was ascertained, if not explained, by some experiments made by Mr. Sennett, and on which he founded a new system of furnace (see "Engineering," 26th August, 1892). The fire bars in general use on board war-ships are of the usual form, of cast iron, iron, or mild steel, and fitted in one, two, or three tiers, as most convenient; in the former disposition the bars are more simply fitted, and, if left free at the front end, and allowed to project below the dead plate of the furnace, they can then be adapted to furnaces of unequal lengths, even if they differ by some centimetres, and it is possible to change the bars one by one when defective while fires are alight, and to move them about to detach the clinker. In furnaces of this type the bearing bar is serrated, the teeth of which fit between the bars, and keep them firmly in place; this arrangement has found favour in our navy in the boilers of the "Bausan" and on board all the ships of the "Etna" type. They are not applicable to boilers of the locomotive type as now made. Recently experiments have been made in various countries to ascertain the form and material best adapted for fire bars, especially for land boilers. The experiments were made with a variety of forms in cast iron, cast steel, iron, and mild steel, and, on the whole, the results of these experiments appear to show (1st) that bars with serrated edges, forming a fine network of holes for the passage of the air between them, are the most economical in the matter of fuel, and in this regard preferable to smooth bars; (2nd) that the hardness of the metal has an influence on the durability of the bars, those made of hard cast steel proving more durable than those of cast iron, iron, or mild steel. The cast bars with serrated edges permit of smaller coal being used than with the ordinary type, but it is more difficult to clean them from clinker, and it is not possible to renew them when burnt. For this reason the ordinary bars of forged iron or steel are still preferred as yet on board ship. When fire bars are fitted across the furnaces, instead of longitudinally, they are easily displaced by the operation of cleaning fires, &c., and the latter disposition is generally adopted. In the Ferrando grate, which is used in many of our merchant ships, the bars are formed of a number of thin plates, clamped together with very small spaces between the plates, and are fitted across the furnace, so that very small coals can be burned without waste, but artificial means are required to force the air through the bars, and consequently, although advantageous perhaps for mercantile ships running at constant speed, they would not be suitable for war-ships subject to frequent and sudden changes of speed.

Clothing of Boilers and Smoke Boxes.—The method recently introduced into the Service is to enclose the boilers, &c., with two thicknesses of asbestos cloth stuffed with silicate cotton; in this manner the inconveniences arising from the pulverization of the silicate

cotton are obviated, and the plan answers well. In consequence of the facility with which this clothing can be removed and replaced, it may be used also for the bottoms of the boilers without interfering with the necessary examinations. The following table gives the relative values of different non-conducting materials as compared with a perfect non-conductor, that is, one absolutely impervious to heat:—

Clothing.	Relative value of the non-conductor.
Perfect material	1·00
Wool and wood sheathing	0·97
Goose feathers and wood sheathing	0·97
Felt „ „	0·96
Coal dust „ „	0·94
Silicate cotton „ „	0·90
Wood fibre „ „	0·88
Spun yarn and canvas	0·88
Plastic cement of different kinds	0·70 to 0·85

Boiler Feed Pumps.—In the mercantile marine, and especially in cargo-ships, the feed pumps are generally worked off the main engines, and although this arrangement does very well where the speed is not liable to sudden changes, it is not suitable for war-ships, subject to constant changes of speed, and for this reason, and in order to have the necessary control of the feed, which would otherwise be constantly disturbed, separate feed pumps are necessary. In our navy, in all the older ships and in some of the modern ones, as for example in the ironclad "Morosini," the "Partenope" and her sisters, and all the torpedo-boats of the "Shichau" type, the feed pumps are worked by the main engines, but in the other ships of more recent construction, it has been preferred to fit independent feed pumps. In my opinion, on which I have more to say later, there is a still better arrangement to be made, viz., to work all the pumps of each main engine by a separate auxiliary engine, that is the feed, air, and circulating pumps, &c. In many ships it has been found advantageous to regulate the speed of the feed pumps automatically by means of a float in the main feed tank, which, in rising and falling with the changes of water level, by means of a system of levers works the steam regulating valve of the pumping engine, and so tends to maintain the water in the feed tank at a constant level. There is a difference of opinion as to the best position for the feed pumps, some preferring the engine rooms, others the boiler rooms. The first position has the following advantages:—

1. The feed pumps are under the direct observation of the person in charge of the main engine, who, knowing the speed of the engines and the probable or immediate changes which are likely to occur, is better able to adjust the feed supply necessary for the whole of the boilers.

2. The pumps are in an atmosphere free from coal dust, and they wear better and work more regularly in consequence.

3. As they are nearer the feed tank from whence they draw their supply, they draw the water more readily, and the suction pipes are not so liable to shocks caused by the variations in the velocity of the water through them.

4. In ships having a number of boiler rooms, a less number of pumps is necessary.

5. The responsibility of the person regulating the feed to the boilers in the stokehold is less, as he only has to regulate the boiler feed valve in harmony with the degree of activity of each boiler, and with the required water level.

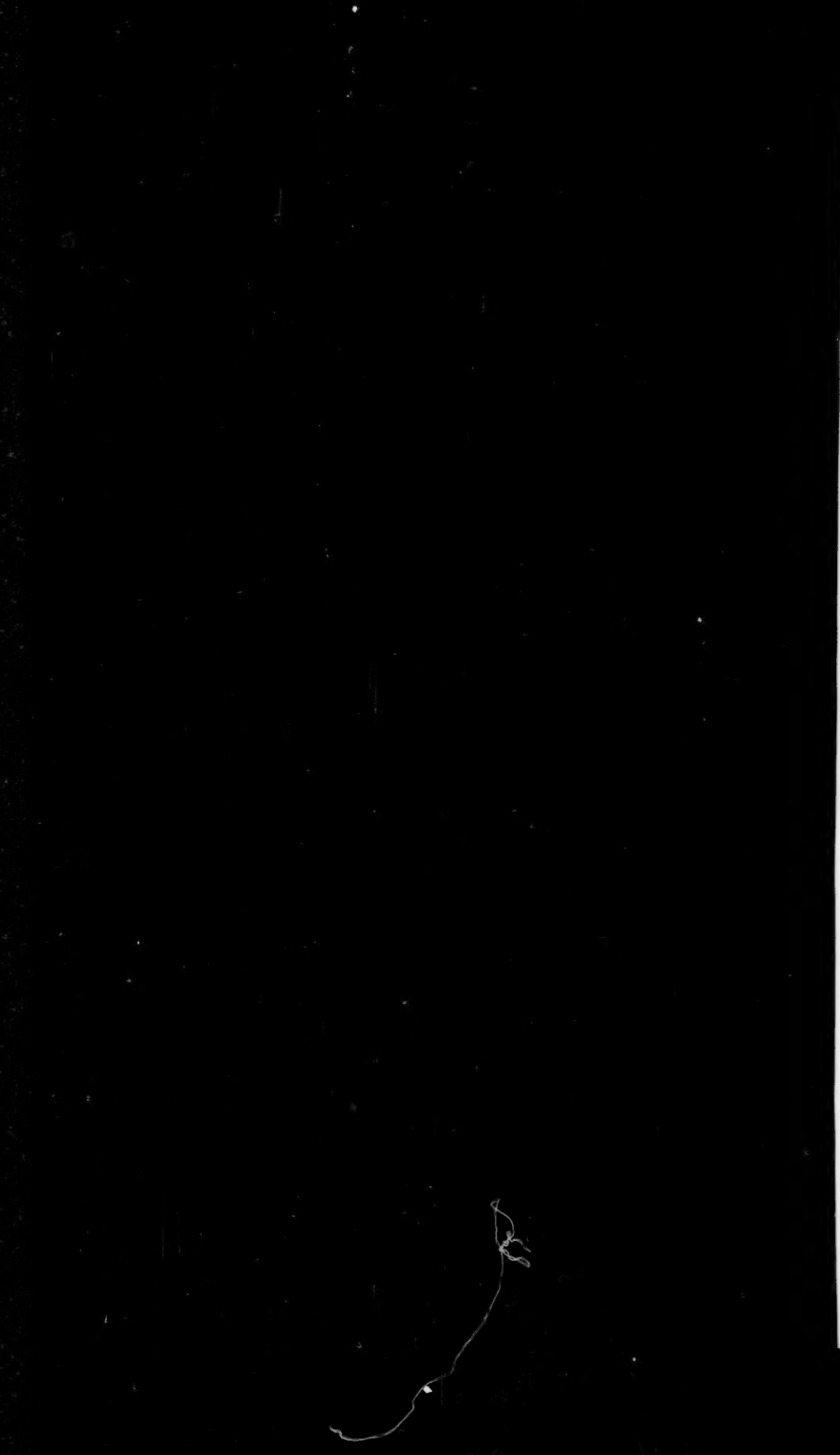
All the eggs are not put in the same basket, as the auxiliary feed pumps are already in the boiler rooms.

Against these advantages the advocates of the second disposition argue that the regulation of the feed is entirely in the hands of those in charge of the boilers, who, in their opinion, are the best able to judge of their actual requirements. This knowledge is, in my opinion, more apparent than real, because the *personnel* in the boiler rooms cannot know accurately the movements of the main engines or the fluctuation in the level of the feed tanks, and in the second place, the person in charge of one of the boiler rooms can only regulate the feed to the requirements of these boilers, without any regard to those of the other boiler rooms. This latter inconvenience could be obviated by dividing the feed tanks into separate compartments, one for each boiler room; but it is easy to see what complications this would lead to in the fittings, besides which, the action of the most distant pumps would be intermittent and irregular, from the length of the suction pipe required. The above considerations are, of course, of a general character; in particular cases either the one or the other of the two arrangements may be found most suitable. If the principal feed pumps are in the engine rooms, there is, at least, one in each, but if weight and space permit, two are fitted, only one of which is used at a time. When, however, the pumps are in the boiler rooms, there is at least one in each. In both cases they draw from the main feed tank and hot wells, and take their steam from the main steam pipe. The various suction pipes lead from multiple suction valve boxes, in which each pipe has its own suction valve; stop valves are also fitted to the discharge pipes. When the principal feed pumps are fitted in the boiler rooms, each has a suction box or "well" underneath or close to it, fitted as low as possible, so that the water will flow into it from the main feed tank by the action of gravity alone. The office of this "well" or suction box is to render the action of the pump more uniform, and also to separate any impurities from the feed water, a rose or strainer being fitted over the end of the donkey suction pipe for this purpose. These suction wells also serve for the application of the float-regulating apparatus, as shown in Fig. 11, by which the speed of the pumping engine is increased or diminished automatically, as required.

The independent feed pumps in use in our navy are of the two-

cylinder "Admiralty" or "Worthington" type; with the exception of the "Piemonte," in which the Admiralty pump works well, these have always worked more or less irregularly, and with a laboured and jerky action. In the ships of the "Tripoli" and "Folgore" type they worked so badly that it was necessary to replace them by "Worthington" pumps; being fitted in the boiler rooms, and continually covered with the coal dust from the bunkers, no doubt caused them to wear very rapidly. The "Worthington" pump having so few working parts, the wear is very slight, and from the absence of dead points and connecting rods, which disturb the relations of the effort of the piston to the resistance of the feed plunger, their action is much more regular. In order for the Admiralty pumps to work well, they must be constructed with the greatest accuracy, and all their parts kept most carefully adjusted, and, in addition, the suction and discharge valves of the pump should give an ample passage for the water with a very slight lift. In order to do this the valves should be annular, such as the valves of the feed pumps on the "Re Umberto," shown in Fig. 12; but in general, in our navy, very light disc valves are fitted to prevent shocks, and the necessary area for the passage of the water is obtained by making the valves sufficiently numerous. In the French navy annular valves, of the "Risbec" type, Fig. 13, are always fitted; but, leaving the type of valve out of consideration, the two-cylinder "Worthington" pumps, for the excellent results obtained with them on ships of the "Tripoli" and "Folgore" class, are now preferred in our Service. The auxiliary feed pumps are placed in the boiler rooms, one in each, taking their steam from the auxiliary steam pipe, and with suctions from the sea, main feed tanks, and fresh-water reserve feed tanks in the double bottoms, but having no connection with the bilges; these must be pumped out by separate pumps, specially designed for this service. Multiple valve boxes are fitted, as for main feed pumps, for the different connections to the auxiliary feed pumps; "many-way" cocks for this purpose are to be avoided, from the risk of error connected with their employment. This multiple valve box communicates with the suction chamber or "well" of the pump, in which the pump suction pipe is fitted with a strainer over its end.

(To be continued.)



A SPANISH VIEW OF THE SPANISH NAVY.

(Translated from the "Correo Gallego," by Major T. F. Dunscomb Bridge, R.M.L.I.).

The following article, from "El Correo Gallego," may prove of interest to the readers of the Journal. To one who has lately been in Spain, and has seen something of both Spanish naval and military officers, it seems as if Spain were at last awaking to the necessity of bringing her army and navy up to the standard of the navies and armies of other Powers. The year 1892 witnessed for the first time the introduction of military manœuvres, and it has been quite refreshing to read the criticisms of the Spanish press on the military shortcomings; at all events the press is not given up at present to belauding either the personnel or matériel of the navy or army.

Having had the good fortune to see the "Pelayo" and the arsenal of El Ferrol, it may not be thought out of place if I preface the newspaper article with a few words.

The "Pelayo," according to Lord Brassey's Annual for 1892, is of 16 knots speed, with a coal supply of 700 tons, a displacement 9,900, and is armed with two 32-cm. 48-ton B.L.R., two 28-cm. 38-ton B.L.R., one 16-cm. B.L.R., twelve 12-cm. B.L.R., five Q.F. 13-m. She has a length of 314 ft. 10 in., beam 66 ft., is of 8,000 h.p., has a high freeboard, with the appearance of being able to keep the sea in any weather; and gives the idea of what a sea-going man-of-war of modern type ought to be. Her barbette guns can be loaded in any position, it not being necessary to train the barbette to a given position, and each barbette gun (4) is in a separate barbette; this is an undoubted advantage, for if the barbette cannot be moved, and the ship has steam power, the barbette guns can be brought to bear.

Ferrol, or El Ferrol, to give it its proper name, has all the requisites of position; it could be easily defended both by sea and land; the fine harbour is surrounded by high hills; there is an excellent dry dock, capable of taking large vessels, the basins are large and roomy, and the store-houses of stone are well built and designed.

"To day we bring to notice the state of the so-called squadron of instruction, the flower and cream of our men-of-war, and the unique sign of our naval power.

"If England, France, and Italy maintain on a permanent footing strong squadrons of armoured ships, they are only acting in accordance with *la haute politique*, and with the most elementary foresight, so as to be ready for any eventuality which may arise at any moment. Besides possessing the number of men-of-war necessary and fit for tactical operations, every year their fleets are exercised in mimic war manœuvres, their reserves are called out, gunboats and torpedo-boats commissioned, the crews trained, and the Officers, Captains, and Admirals receive useful instruction, not only in the practice of

command and management of ships-of-war, but also in tactics and strategy, and in all the technical incidents which can arise during these sham fights.

"Now we will examine our naval government, and see if the system and the organization of our navy has any resemblance to the above. A few lines will suffice to discuss and to examine our system. Our fleet is in reality composed of only one armoured ship, the 'Solitaire,' under which nickname we recognize the 'Pelayo;' for the 'Vitoria' has run back from where she ought to have remained, inasmuch as she has not been altered up to date, notwithstanding that all naval opinion loudly demands that not only she, but also the 'Numancia,' should be altered in accordance with modern requirements. The cruiser 'Reina Regente' is of modern type, but more fitted to accompany a squadron of three or four armoured ships, which is the *rôle* of her class of war-ship; in the same class is the 'Alfonso XII,' but she is of an older type. These war-vessels do not constitute a fleet, nor yet a division, according to the principles which to-day are acknowledged in all navies as indispensable in making up their tactical unit.

"With this class and number of war-vessels, and with next to no organization for the defence of our coast line (for the few torpedo-boats which we possess remain from year to year in our dockyards) nothing is done even on a small scale, as is the case with the army, to carry out useful instruction for the personnel of the navy.

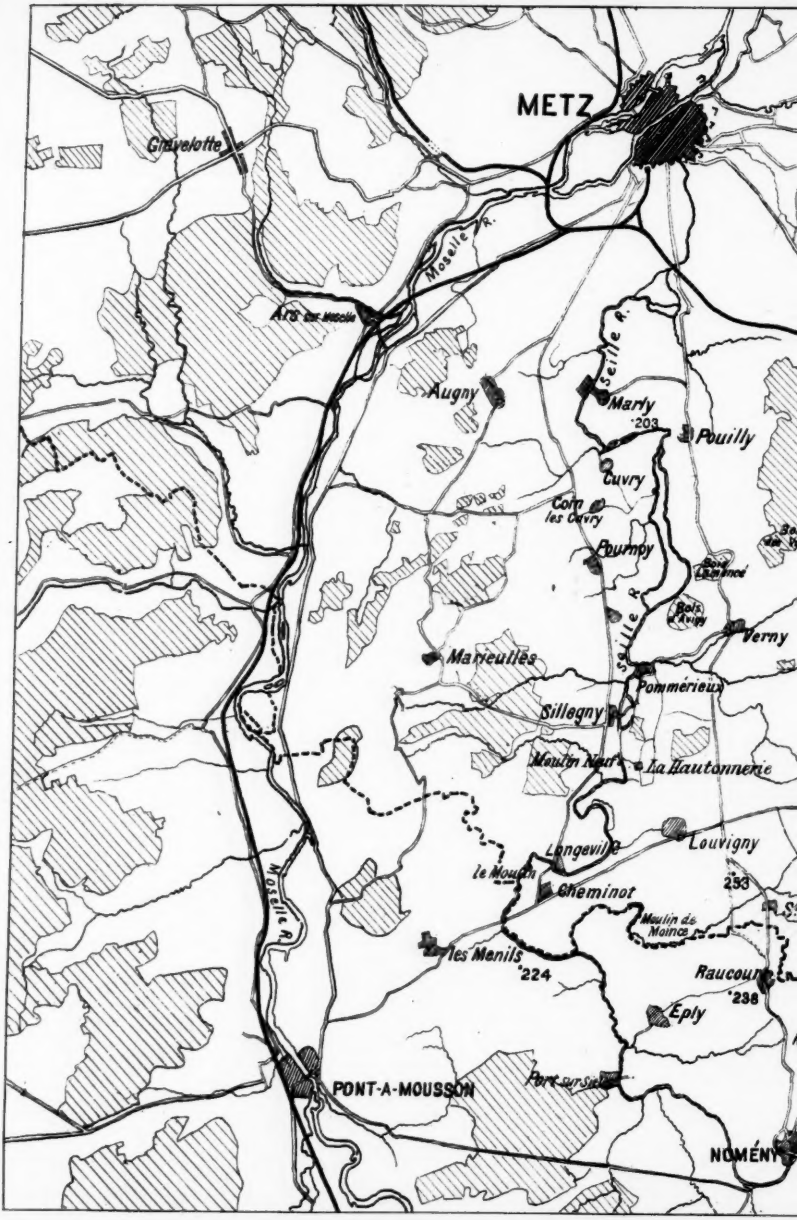
"Indeed, the mission of our so-called navy consists only of assisting at our naval displays, or of showing itself now and then in foreign ports, in order that the whole world may know, even to satiety, that we possess a 'Pelayo' and a 'Regente,' which pass the year going between Port Mahon, Barcelona, and Cadiz, and by this means killing time, until the arrival of the spring, when they serve as a means of recreation to the bathers at San Sebastian.

"The 'Pelayo' and the 'Regente' are the only men-of-war we have afloat which are up to modern requirements, and these are going with gigantic steps towards a premature decay, owing to the useless employment which is made of them, notwithstanding the many samples which our dockyards can show of ships in a prolonged state of paralysis. In order that their sister ships which are now building may be saved, let us hope that they may be employed in regular work. We are told that the two men-of-war already spoken of require at once important repairs, and that their boilers are in a bad state.

"In addition to the advantages which would accrue from a proper system of organization in our navy, others no less beneficial would take place in the existing matériel.

"To maintain these men-of-war is most costly, on account of the numerous personnel, the quantity of plant, the consumption of coal, oil, &c.,; and thus ships are put in commission which it would be more economical to commission as a flying squadron for purposes of instruction; this would be cheaper and more suitable on account of the small amount of fuel required, as well as the little deterioration arising in the ships, which would not be battle-ships."

MAP TO ILLUSTRATE MOLTKE'S TAC



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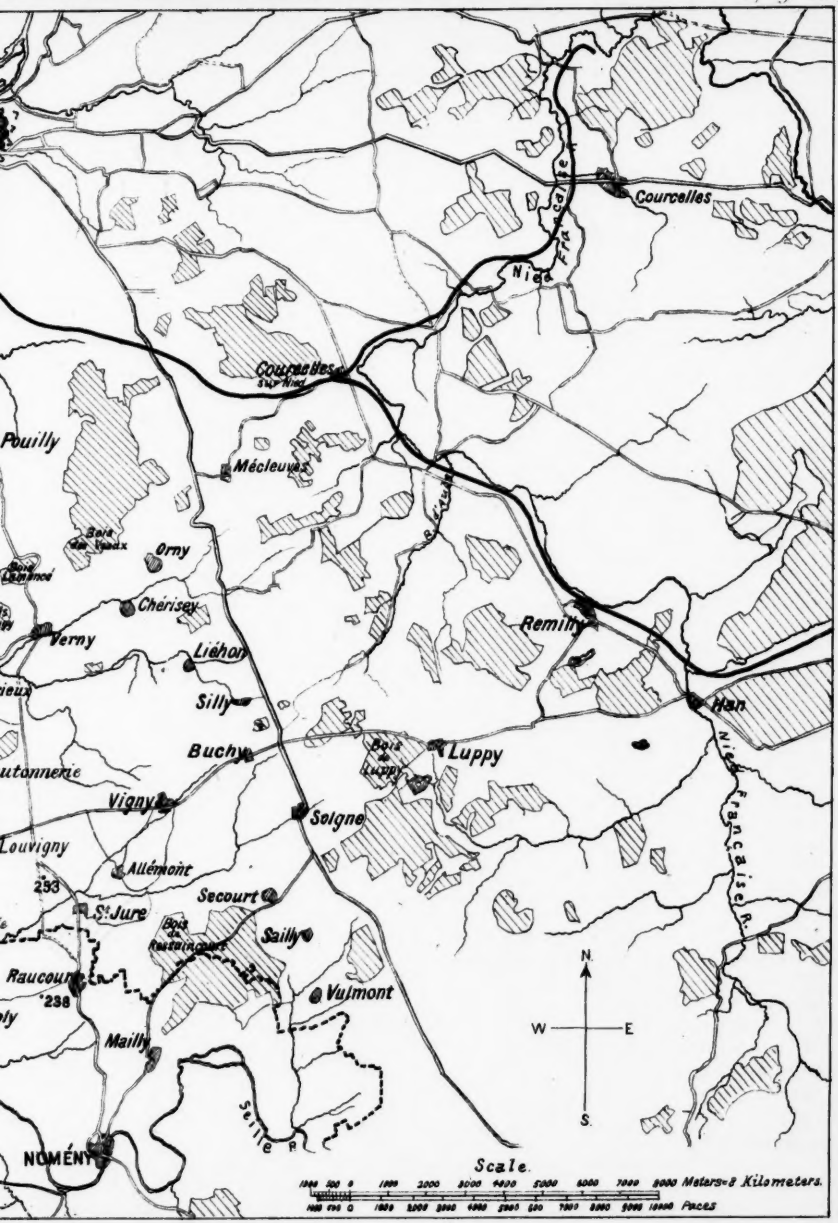

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MOLTKE'S TACTICAL EXERCISES, 1858–82.[1]

By Captain F. Maude, (late) R.E.

Ever since the year 1857 it was the custom of General Field-Marshal von Moltke, in his capacity as Chief of the General Staff, to set a couple of schemes annually to the Officers who were qualifying under his supervision for employment on the Staff. In this category are included not only those who have passed through the Staff College, but also those permitted to attend on account of war services or special qualifications without having passed the preliminary training at the College.

The title, "Tactical Exercises," is somewhat misleading, as of tactics pure and simple, the handling of troops in action, these exercises contain very little indeed; they correspond more to our Staff College exercises, and deal entirely with the execution of orders received from higher quarters, such as fall to the lot of Officers on the Staff of corps, divisions, and detachments of the three arms.

Great strategical questions are merely touched on, so that those who look to find indications of German plans of operations in future campaigns will be disappointed; all that they will find, but it is worth close study even then, is an outline of the general principles and method of dealing with minor problems on the margin between tactics and strategy, as they are viewed in the German Army; and the main points which will, I think, impress themselves on the student's memory are the care and forethought always devoted to the maintenance of the fighting strength of the troops, the recognition, in fact, that troops are flesh and blood and not machines; and the avoidance of interference of the higher staffs, without adequate cause, with those next below them in the military hierarchy.

It was my intention, originally, to have translated the most important of these exercises verbatim and without comment. Unfortunately, at the last moment, I learnt that the publishers had been forbidden to accord permission for the translation of the book, and hence I was compelled to throw my work into review form and thus to assume, against my will, the office of critic to Moltke.

Still it must be remembered that Moltke was but human, excessively gifted, but still liable to human error if only to an almost infinitesimal extent, and the best of any man's work can only be arrived at by the friction of discussion.

The two[2] examples given are fairly typical of the whole work, but have been specially selected because the maps necessary for their study are already accessible in the official history of the 1870 cam-

[1] "Moltke's Taktische Aufgaben aus den Jahren 1858 bis 1882, Herausgegeben vom Grossen Generalstabe." Berlin, Mittler & Co., 1892.

[2] In reality three examples are given. See note on p. 179.—Editor.

paign, and the ground round Metz has been and is so frequently visited by British Officers, particularly from the Staff College. I should also point out that the problems themselves were worked out from the map (scale for No. 57, 1/100,000; and for No. 63, 1/25,000).[1]

57th Exercise. 1878. (Plate 6.)

A cavalry brigade at Verny is covering our frontier. It holds the passages of the Seille (unfordable) from Marly to Cheminot with dismounted men.

The patrols endeavouring to gain a look into the country beyond the wooded heights on the right bank of the Moselle are driven back by infantry.

The bridge at Ars-sur-Moselle is occupied by troops from Metz, from whence also arrangements for the local defence of the railway to Saarbruck against small raids by the enemy are made.

In the course of the 1st May, a reserve division of all arms, destined to complete the garrison of the fortress, is detrained at Courcelles, but for the moment receives orders to cover the most exposed section of the railway from Courcelles to Han.

The cavalry brigade is placed at the disposal of the Divisional Commander.

It reports that to the evening of the 1st May its posts on the Seille have not been molested.

1. How does the General contemplate fulfilling his orders?
2. What will be his next orders?

"*Written Solution by General von Moltke.*

"(1.)

"The Commanding Officer will best fulfil his mission by placing himself in front of the line to be defended. He gains thereby the strong line of the Seille before his front, protects his eventual retreat on Metz, and in all cases prolongs the time the enemy will require to reach the railway.

"In all probability the enemy will make use for his advance of the permanent crossings over the Moselle at Pont-à-Mousson and the roads radiating towards us therefrom. This determines the main direction for the march of our division.

[1] The maps required for the study of these exercises are issued with the German text, but maps on the same scale will be found in the Official Account of the Franco-German War, 1870-71 (Clarke's Translation), as follows:—For the 57th Exercise the map is Part I, vol. i, map No. 11 (country round Metz; S.E. portion only). The map for the 63rd Exercise is Part I, vol. ii, map No. 1 (Battle of Gravelotte-St. Privat, numbered as Plan 6A in the German Edition). For the convenience of members who may be unable to consult the official history of the Franco-German War, the accompanying rough sketches have been prepared from the official maps. It is, however, only fair to Captain Maude, who is residing abroad, to state that he is in no way responsible for them, as they have been made without his knowledge, and want of time has prevented their being submitted for his approval.—EDITOR.

"The necessity of strengthening our right flank compels a strong detachment of force towards the lower Seille.

"Whether we shall be able to advance as far as the Moselle, cannot be settled without further information.

"(?.)

"Since the Seille is still in our possession, we can afford the division the convenience, after their long and wearying railroad journey, of cantonments in advance of Courcelles from Mécleuves to Silly, and begin our march from these in separate columns.

"The 1st Infantry Brigade, 1st squadron hussars, and 1st and 2nd batteries rendezvous at Mécleuves, 5 A.M., on the 2nd May.

"The 1st battalion 1st Regiment, and 1st battery, march direct to Pouilly and arrange Marly for defence with one company, destroying the bridge over the river.

"The battery will, according to the enemy's movements, either take up a position on hill 203, west of Pouilly, or to the south of that village, from whence the flat open ground from Augny to Coin is commanded.

"The main body of the brigade marches by Orny and Verny to near Louvigny, leaving the 2nd battalion 1st Regiment, and the 2nd battery, in Verny, and occupying the Bois Lamencé and Pommérieux with a company each.

"The bridges towards Coin and Sillegny will be destroyed and taken under the fire of the battery from a position close to the eastward of Pommérieux.

"The cavalry brigade, after withdrawing its patrols behind the Seille and establishing a line of relays on the road Pouilly—Louvigny, moves from Verny to Vigny, and forms under cover south-west of the latter place.

"The 2nd Infantry Brigade, with 2nd, 3rd, and 4th squadrons hussars (the hussars belong to the infantry division), and the 3rd and 4th battery, forms up at 5 A.M. at Silly, and marches by Vigny to Louvigny.

"The 10 battalions, 19 squadrons, and 3 batteries, united here about 8 A.M., take up a position in advance of the road Verny—Raucourt on hill 253.

"Louvigny and St. Jure, on either flank, will be occupied. A detachment in La Hautonnerie destroys and watches the bridges at Moulin Neuf. Only an observation post will be placed in Cheminot.

"Along the front of the Louvigny position, in which an attack is to be expected, shelter trenches, giving cover to men lying down but not of sufficient profile to obstruct a cavalry advance, will be immediately excavated.

"Epaulements will be thrown up for artillery, but the batteries will remain under cover till the direction of the enemy's attack has become apparent.

"The substantial bridges at Longeville and Les Menils are not to be destroyed, only barricaded, as we desire the attack to come from that

direction, and may require them for an eventual advance to the Moselle."

"*Verbal Criticism by the General.*

"Our mission was to protect the most endangered section of the railway Courcelles—Han against possible interruptions by the enemy, probably because the line was still required for further transports to Metz. It is clear that, to fulfil this mission, we must place ourselves in front of the enemy.

* * * * *

"Since our ultimate destination is to complete the garrison of Metz, an offensive towards the Moselle is excluded.

"We must assume a defensive attitude, and make the most of the advantages the ground affords us.

"As we can only make a single march without the prospect of an encounter with the enemy, our first aim must be to reach the Seille on the 2nd May. At what point we must settle hereafter.

"In the solutions sent in there are three markedly different lines of thought.

"Many of you have moved to Buchy or its vicinity (Luppy—Solgne), but there no support is to be derived from the nature of the ground. You may be outflanked and driven both from the railway and from Metz, for the latter lies in the prolongation of your front.

"Some, therefore, do not propose to remain at Buchy, but to await there further information, and then move against the enemy. But till to-morrow morning you are not likely to obtain any further information, and what has disclosed itself during the day you already know. At the outside, you may learn that the cavalry patrols have encountered infantry fire near Noméný, much the same as the day before from the heights beyond the Moselle. Then, if you march to meet the enemy you will no longer arrive in time to hinder his debouching, and will perhaps be compelled to fight in most unfavourable ground; for you cannot tell exactly where you will meet him.

"Those who thus wish to await further intelligence at Buchy do not fulfil the conditions of the exercise. They thereby give expression to the thought that the general idea is insufficient, and that they will await its development.

"Some others have taken a flanking position by Verny. There is something to be said for this view; but there are drawbacks here too, for this position does not altogether fulfil one of the most important requirements of a flanking position, viz., that it must threaten the enemy's line of retreat. Whilst we can only base ourselves on the single point 'Metz,' the enemy has a much wider field. He can move on the arc from Pont-à-Mousson by Noméný, and even further to the eastward, or if he crosses at Cheminot and then fights with his front towards Verny, Noméný is still behind him.

"The destruction of the necessary bridges to secure the right flank I consider justified, for a possible ultimate offensive on our part will be tied to the main roads. But something further must necessarily

be done to secure our rear, for otherwise the enemy may hold us by demonstrations on the lower Seille, whilst he crosses his main force over higher up, and places us in a serious predicament.

"I have detached a battalion with a battery to Pouilly, and occupied Pouilly and Marly with a company each, whilst the battery on the height east of Marly covers the whole valley between Cuvry and Coin. This will prevent the enemy throwing a bridge here. My main body marches to Louvigny; if it detaches a battalion to Verny, the lower Seille is completely closed. If the enemy endeavours to pass at Cheminot, the most favourable place for the purpose (a wide re-entering sweep of the stream), he cannot find room for deployment across the peninsula, and we can meet him on a broader front. If he elects to advance by Noméný we can meet him with equal ease from Louvigny.

"I consider, therefore, the position of Buchy to be a mistake. A flanking position at Verny may have good results; but for myself I prefer Louvigny.

"The Officers with a different opinion have developed their views clearly and logically, even though they have not come to the same conclusion; but I admit the problem was a difficult one.

"One other point I should like to touch on—the employment of the cavalry. Many of you, particularly the cavalrymen, have asked rather too much of it. They have ordered it to 'maintain' the line of the Seille. That is more than can be safely demanded of the arm. Cavalry always feel somewhat uncomfortable dismounted, and I believe it is easier for them to attack a village on foot than to defend it. The garrison does not know what is going on outside, and is nervous about its led horses, &c. Generally, defence is not the strong point of the cavalry soldier."

The next exercise[1] grows out of the preceding one during the course of the 2nd May. The position indicated above is occupied and entrenched, and on the morning of the 3rd the enemy advances with 6 battalions, 8 squadrons, and 2 batteries from Corny towards Coin-les-Cuvry, whilst considerably stronger forces are discovered approaching from Pont-à-Mousson *viâ* Les Menils.

All attempts to bring up bridging material on the left, fail before the fire of the battery at Pouilly and of the infantry in the village and the copses near Verny, but on the right, artillery deploys to the left of Longeville and to the right on hill 224, whilst infantry advance against the weakly held and barricaded bridges; the post in Cheminot withdraws, not without loss. The enemy occupies Cheminot, but his attempts to advance beyond, break down under the fire of our three batteries; the village catches fire, and the enemy withdraws under cover.

A pause in the fight ensues, and during the afternoon great dust clouds appear to the south-westward.

[1] In point of fact this is the 58th Exercise. The map required is the same as for the 57th Exercise.—EDITOR.

The 1st Uhlans, who have trotted forward by Allémont, repulse a flanking party of the enemy near Raucourt, and from the neighbouring height (238) make out 10 battalions, 10 squadrons, and 4 batteries advancing from Port-sur-Seille towards Nomény and Mailly.

The regiment withdraws to St. Jure, where a skirmish takes place, but the day ends quietly, leaving the enemy in Longeville and with the bridge at Les Menils in his hands. Numerous watch fires are visible behind Mailly. The posts in Pouilly and Verny report during the evening that the enemy opposite them is withdrawing towards Marieulles, where bivouac fires presently appear.

"How does the Officer Commanding the Division judge his position, and what does he intend to do in the following three cases:—

"1. If the enemy attacks next morning with the forces united round Raucourt or Louvigny.

"2. If the cavalry discovers that the heights at Raucourt are only held by the enemy to cover his own communications, whilst the rest of his troops are marching by Secourt against the railway.

"3. If the enemy waits at Raucourt till the troops at Marieulles can debouch by Cheminot."

"*Written Solution by the General.*

"The heights at Louvigny show front also to the south, commanding the ridges beyond and offering a clear field of fire. The division drawn up here has its communication with Metz directly in its rear. The enemy has his in prolongation of his flank and cannot march past our position without completely exposing them.

"Having beaten off all attacks on the lower Seille during the day, we can now reduce the troops on the river to the 1st battalion 1st Regiment, and 1st battery, and draw in the same evening the 2nd battalion and 2nd battery from Verny to Louvigny.

"*Ad* I.

"The division fronts to the south and awaits the attack.

"As point of support for the right wing, a redoubt on hill 253. The edge of the valley into Vigny beck will be entrenched this evening (3rd May) with shelter trenches and gun epaulements.

"St. Jure and Allémont, lying within the most effective range of our guns, will be occupied and arranged for defence.

"After the occupation of the trenches has been provided for, the remainder of the infantry places itself under cover on the reverse slope of the heights. The cavalry behind Vigny, from whence the enemy's advance can be threatened in flank.

"The distance from Louvigny to Vigny is too extended for a single division, but both villages will receive a small garrison, which may be supported according to circumstances during the engagement."

As already pointed out, the refusal of the German Staff to sanction a translation of the work, forces me to interrupt the thread of the narrative with personal comments, in order to make this article into a review. I will here intersperse a few remarks; they may at least set

other minds thinking, and, after all, Gautama Buddha's advice to theological students applies equally to military matters. As near as I can recall them, his words were :—

"Believe nothing because others have told you; or because your forefathers believed before you. Investigate everything for yourself, and only believe the residuum."

I will apply this principle here.

No doubt Moltke had excellent grounds for his advice, but looking at these orders from an engineer's point of view, it strikes me that the man entrusted with their execution would find his work cut out for him.

He, or some one, is to prepare gun epaulements for the batteries, but to do so he must have some reasonable certainty as to the direction from which the enemy is to be expected.

A glance at the map, however, will convince anyone that the ground afforded him no guide whatever, for within effective shrapnel range there are a dozen positions at least.

He may simplify matters by the creation of alternative positions, but the working power of his men is limited, and the ground, according to my recollection, remarkably rocky. Since Moltke, considered as Officer Commanding, with his one Staff Officer, could not conceivably lay out all the pits or epaulements, and since, moreover, the system of the German Army leaves these matters to the batteries, the chances are, when the enemy's attack disclosed itself, the pits would be all found pointing in any direction but the one from which the danger really threatened, and the gunners would unlimber beside the little holes and wonder why they had taken the trouble to dig their own graves overnight.

Again, the infantry entrenchments are to be dug along the "Thalrand," the edge of the valley, not the watershed of the hill, and the Thalrand occurs some 300 yards below the watershed. Not only the trenches, therefore, but the approaches to the trenches will be in the full view of the enemy, and since the enemy is nearly two to one, and is assumed as equally brave, the three batteries will be crushed in an unequal duel of two to one, and the supports to the fighting line must be brought up in the full sweep of the victorious artillery's shrapnel.

Now, the best troops in the French Imperial Army, long-service, war-seasoned men, failed entirely to accomplish similar feats in face of the fire of the old Krupp common shell (*vide* Prince Hohenlohe's letters on Artillery), and the power of the French shrapnel in 1878 was at least five times as great as that of the Krupp's the Germans used in 1870, and their skill in employing them at least equal, for in 1870 only a part, not the whole, of the German batteries had learnt to shoot. It will be remembered that in the incident Prince Kraft alludes to above, he especially remarks that the Captain (von Pritzewitz) of the battery that so brilliantly beat off the French advances from Amanvilliers, had attended the School of Gunnery and knew how to handle his weapons, implying thereby that many of the others had not arrived at the same point.

Of course in 1878 there was no smokeless powder, therefore the

difficulty of reinforcement would not be so great; in the early morning of a May day the smoke might reasonably be expected to hang, and behind the screen thus formed the supports might come up unobserved. But even this aid is denied the unfortunate defenders of St. Jure and Allémont. It is true they lie in the "most effective sweep of our artillery fire," but what will that help them when the artillery fire is snuffed out?

Nothing so far as I can see.

Either support must be sent them across the valley in the full sweep of the enemy's fire (when how many would ever arrive?), or they must be abandoned at the first vigorous infantry assault. Then round the corner of the hills, which seem made for the purpose, issue a couple of smart lancer squadrons (the French had none in 1878, but no matter), and then their doom is sealed.

The anxious care for the communications with Metz seems scarcely in accordance with Moltke's own dictum in a former exercise, No. 50, where, discussing the use of a flanking position, he points out that with special reference to the risk to one's communications entailed, a force operating in its own country has an immense advantage, as it can fall back anywhere without serious danger. But here he is operating in his own country. Why not utilize the advantage? The cavalry brigade on the 3rd seems to have been extremely unenterprising; they trotted out to Allémont and back, but of Officers' patrols to Secourt, Sailly, and Vulmont we hear nothing; yet even before the days of "long distance rides" such distances were mere child's play.

Would it not have accorded better with the traditions of the Prussian Army to have moved off to a flank to Buchy and Solgne, about eight miles, and then attacked straight to their front? It must, at any rate, have upset all the enemy's plans; and even if not successful, as against the odds it might well not have been, then retire on the railway at Remilly; wire the traffic manager to have twelve infantry trains in readiness, and gaining time by repeated stands along the edges of the Bois-de-Luppy and of the woods of Remilly, which woods could be held by dismounted dragoons long enough for the infantry to entrain, then let the batteries limber up, the cavalry mount, and the whole trot comfortably away to the northward, fetching a circuit back to Metz. Infantry on foot cannot catch infantry behind a locomotive, neither can they overtake cavalry, guns, and properly horsed trains. As for the time necessary to entrain twelve battalions without wagons, the railway trains being ready in order along the rails, twenty minutes will suffice for the lot, for it does not take longer for eight men to get into one compartment than for 12,000 into 1,500 compartments; the first train goes off at full speed, the remainder follow in turn as fast as the block in front is clear. This is the way the Brighton railway clears volunteers out after an Easter Monday, and it is also the way Vinoy's Corps slipped away from Sedan. As for the loss of regimental trains, they are going back to Metz, where they can be replaced if lost; but if the trains are properly horsed, and the cavalry and artillery skilfully handled, there seems to be no reason why they

should not rejoin their commands next day at the latest. Besides, if the choice lies between the loss of your trains and the extermination of your combatants (and, in face of the enemy's superiority in artillery, this would be their fate if left between Louvigny and Vigny), then of two evils choose the least.

To return to our original.

Ad 2.

"The Division attacks the enemy before it.

"The enemy has left posts at Longeville and Les Menils. The detachment at Marieulles has three to four hours' march to unite with the main body about Raucourt.

"If the enemy weakens himself by strong detachments towards the railway (small ones our cavalry will look after), we have a fair chance of beating him at Raucourt.

"Under cover of our artillery the infantry descend the slopes to the Vigny, cross the stream, and form in two lines, supported on either flank by St. Jure and Allémont. Our cavalry trots down the chaussé past Louvigny, crosses the Vigny at Moulin-de-Moince, and places itself on the right rear of the infantry, whence it threatens the enemy's retreat, and will find the best field of attack. Two batteries follow the infantry, and come into action at close ranges against Raucourt and the point of the Bois-de-Ressaincourt.

"The enemy will recall in all haste his detachment from Secourt, but will probably be beaten before it arrives. This offensive would, however, not be possible if the detachment from Marieulles had already effected its junction with the main body at Raucourt, and even the defensive in the Louvigny-Vigny position is scarcely to be recommended if the Marieulles force has already reached Cheminot."

Here again the possibility of descending the slopes to the Vigny depends on the result of the preliminary artillery duel.

Now apart from the batteries in action on the 3rd May, there are also the four seen by the cavalry advancing from Port-sur-Seille on Nomény and Mailly; there are, therefore, at least six, probably seven, of which two may be assumed at Secourt.

From Raucourt to Secourt is roughly 4 miles, or 12 minutes for a decent galloper; allowing 10 minutes to hook in, the batteries can be in action half way between Raucourt and Secourt in 15 minutes or less. Within an hour the Prussian 3 batteries may be confronted by 6 to 7 French ones, and even if the first on the ground have been crushed, they will have left their mark on their opponents, and the fresh arrivals should have a fair chance. The infantry, too, can be in Raucourt in an hour and a half, or, moving by Secourt on Allémont, they will take the assailants under fire or in flank in 45 minutes from the moment the galloper leaves Raucourt, and with every reasonable prospect of success, for the ground favours their approach. Looking at the matter dispassionately, I should say the fate of the leading Prussian troops would be that of their 9th Brigade at Vionville, only worse, for in 1878 neither side could claim an advantage in artillery armament.

To proceed.

Ad 3.

"The enemy remains quiescent about Raucourt, till the troops from Marieulles can debouch by Cheminot.

"The division withdraws on Verny, and picks up the 1st battalion and 1st battery.

"The withdrawal takes place by the four parallel roads between Pommérieux and Liéhon under cover of the ridge of Louvigny; at first through the battalions, then by échelons through the artillery, at last through the skirmishing lines and the flanking cavalry.

"The heights between Verny and Chérisey afford a suitable front for a division with free field of fire; on the right the Bois d'Avigy, and reserves under cover.

"The enemy will hardly dare to move past to the eastward without attacking the division only $2\frac{1}{2}$ miles on his flank.

"The position of Verny can only be turned by its left, in which case the Bois-de-Veaux and Orny afford the defender fresh points of support, and, besides, the assailant must look after his own communications.

"In face of the marked superiority of the assailant, the defender can only attain one of his objects, and that the maintenance of his communications with Metz; but meanwhile five or six days have been gained; the protection of the railway may no longer be necessary, or may be taken over by other troops."

It seems hardly fair to bring in this "Deus ex machinâ" of other troops, for there is no mention of them in the original problem. If they are available, they may just as well close the gap between us and Metz, and leave us to deal with the enemy.

But if we are to introduce fresh conditions, then let us look at the matter on the assumption that the French adopt another course, viz., call in all their available batteries under cover of their advanced posts (the batteries can easily cover the distance), and at daybreak of the 4th, under cover of an overwhelming artillery, attack, possibly catching the enemy in the act of retiring. The troops from Marieulles cut in from Cheminot, a chance Moltke has himself pointed out, and there is room enough between Louvigny and the guns of the forts to cut the unfortunate Prussian division to pieces.

I am well aware of the objections to moving tired troops by night; but the division has not had a severe day, is in a critical position, and anyway the men are presumed to have energy to spare for entrenching purposes. I should prefer to use that energy for marching, and, after totalling up the possible distances marched on the 3rd, would prefer the movement to Buchy recommended above. It would take me less time to march to Buchy than the enemy would require to call in his detachment from Marieulles. If he attacked northward he would strike into the blue, and I would catch him in flank as he passed.

If he advanced by Secourt I should again be on his left flank, and if he waited in position I should at least be able to attack him in ground most unfavourable to the defence.

Further, it seems just a case where the utmost possible advantage may be derived from the mobility of cavalry and artillery; leaving the

gunners in position overnight covered by cavalry scouts; main body towards Vigny. I would open fire at daybreak at a long range, and endeavour to draw the enemy into an engagement; then, as soon as his troops began to form for the assault, limber up and disappear behind the ridge, taking ground eastward towards Buchy. The enemy's infantry cannot march as fast as guns can trot, and, if their cavalry come in pursuit, the cavalry brigade would have an opportunity of dealing with them. Meanwhile, whilst the enemy is storming the undefended hills, my infantry from Buchy and Solgne are swarming through the woods on their flank, and the guns are in action again where the enemy's guns cannot get at them. One would still have the odds numerically against one, but one has gained time, thrown the enemy into confusion, neutralised his superior artillery power, and got the advantages of the ground all in one's own favour.

"*Verbal Criticism by General von Moltke.*

"On the evening of the 3rd May we are very well informed of the movements and position of our adversary. It is not likely that, after the failure of his attempt during the day at Verny—Marly to force a passage, he will renew his efforts to-morrow; we can therefore draw in our detachments from Verny and Pouilly. I think we may even call in the battery which, at the outside, need only leave *some* guns at Pommérieux. This whole movement must be carried out the same evening, by way of Coin, to remain unobserved."

I would here interpolate the remark that from Pouilly to Louvigny is half as far again as from Louvigny to Buchy, so that the troops are well able to undertake the flank march suggested above.

"The enemy stands opposite us in two groups; the attitude of our division is therefore clear.

"Most of you have decided that in case the enemy attacks from Raucourt, you will remain and meet him at Louvigny.

"I assume that the position of yesterday is not intended for that fronted westward, and therefore exposes its left flank. I should have preferred that some of you had given me a characteristic report of the position facing south, for one must be clear in one's own mind how one intends to form one's troops.

"Others wish to rest their left on Allémont, but this has the drawback that the line can be overlooked from the heights west of the Bois-de-Ressaincourt, and that the Vigny beck divides it into two sections."

It might be added that the enemy, whose presence in Secourt may be assumed from the cavalry reports, and is assumed by Moltke (*vide supra*), would then be within 4,400 yards, $2\frac{1}{2}$ miles, and in direct prolongation, of the Prussian left flank.

"I should post myself along the Louvigny—Vigny line, bivouacking the troops along the connecting road, with outposts towards St. Jure and Cheminot.

"The front, however, from Louvigny to Vigny, 4,000 yards, is too extended for a division. The right flank will therefore be formed by

a battery on hill 253, south of Louvigny, which can be adapted out of yesterday's earthworks. It will flank the ravines of the Vigny and Seille." (How is not very apparent from the map.)

"As support for the left, another battery will be thrown up about 2,500 yards east of Louvigny, and along the edge of the valley a shelter trench of light profile will be dug so as to permit our 'tirailleurs' to sweep the slope."

Here, again, there are points to notice in passing. The three batteries are to be separated into two groups, and the trenches are to be occupied by "tirailleurs," not lines. Nothing is said of covered ways for the supports; and it is not easy to see how a shelter trench of light profile is to be constructed on ground sloping at least one in six to the front. The attempt would only lead to scarring the face of the hill with a well-defined line, affording a most favourable mark for the enemy's artillery and rifle fire.

If the Louvigny—Vigny line is to be held at all, would it not be better to adopt the peninsula trick of deploying under cover along the ridge and meeting his skirmishers, not with the bayonet exactly, but with rapid fire at 100 yards, in that formation which affords the maximum fire power, viz., line two deep—preserving to one's self the advantage of feeding up one's supports unobserved? I remember seeing an attack thus met near Homburg in 1883. I think it came about by chance, not design, and the advantage the closed line displayed left an abiding impression on some of the eye-witnesses, at any rate.

But to return to the text.

"Allémont, St. Jure, and Moulin-de-Moince are to be occupied as advanced posts, the first two to be obstinately defended, since they are well supported by artillery fire, but the mill only to be held lightly, as there are some six to eight passages.

"Generally, in practice, such a brook is no real obstacle; at Woerth we had to deal with quite a different stream.

"Towards Louvigny and Vigny I should detach but slightly; if circumstances require it, they can always be supported.

"The cavalry is under cover behind Vigny, the reserves behind the left wing to guard against the chief danger, viz., being driven off Metz and into the Seille.

"I must here refer to one or two schemes in which the idea of the offensive has been clearly and logically worked out. And certainly a successful attack solves all three questions, but, it must be successful. This is, here, very doubtful; for, in assuming the offensive, all the advantages of the defence pass over to the other side, which, in this instance, is the stronger in numbers. We must attack direct, and that would be very uncertain, for the experiences of the last war teach that the attack can only succeed when it turns a flank, which again implies the necessity of a numerical superiority we do not possess. And this, again, leads us to the decision to attack ourselves, if the enemy makes the mistake of detaching towards the railway before having beaten us; for if his detachment is too weak it will never reach the railway at all, and if too strong we shall have all the easier

task with the remainder, and the detachment will retrace its steps of its own accord.

"The execution of the attack may vary, as it always does in such cases. I will, here, only give an illustration, viz., a wheel to the right of the Division, holding St. Jure as pivot. I prefer the covered ground about that place for the deciding arm rather than the more open country to the westward.

"I concentrate five of my batteries on the Bois-de-Ressaincourt and carry it with an infantry regiment from Allémont. The possession of this wood has a double value; in the first place I can collect my troops behind it and make it a stepping-stone to the seizure of the village beyond; in the second, it gives me a point of support against the enemy returning from the east. After the capture of the line St. Jure—Ressaincourt, the Division advances to the assault of the main position about Raucourt. The cavalry finds employment partly behind the left, reconnoitring towards the east, partly on the right, in the open country towards Eply. This is only one solution; there are many others possible."

I trust that at this point the reader will turn to the map and realize what it entails.

The enemy is not likely to have sent many guns towards the railway, for guns are not required for the purpose of destroying railways, but he can afford to send a couple of batteries and still preserve a numerical superiority. These must be silenced first, and that will be a difficult task, for the Prussian guns are in two groups, 2,500 yards apart, and combined action will not be easily attainable. Whereas, by the lie of the ground, the enemy's batteries can be massed against either group independently and the probabilities then will be all against the Prussians.

But assume the contrary. Still the Bois-de-Ressaincourt is 3,500 yards from the main Louvigny—Vigny ridge, rather an extreme range for shelling the edge of a wood, and the only other position for them is on the plateau east of Allémont, where they would stand with their right rear barely 1,500 yards from the Bois-de-Solgne and Buchy; and from which position, to judge by the maps, the Bois-de-Ressaincourt can hardly be visible. It is doubtful, even, if it is visible from Vigny or Louvigny, as it appears to be hidden by the shoulder of the hill; and, in any case, it seems an extraordinary position for infantry to choose for defence, since they could not possibly see into the hollow ground in front of them. But assume it carried, and the Division in full march for the heights of Raucourt; they would then be fronting almost due west, with a detachment either small or large directly in their rear. If it is small, then the troops on the spot will be better able to take care of themselves; and if large, so much the worse for the attacking party.

All this time we are assuming that the troops in Secourt actually did march eastward; for if they remained halted, the wheel to the left is obviously impracticable.

But is not this assuming rather too much?

In the first place, from Secourt to the railway is a scant 12 miles,

and Officers' patrols would have reached it probably overnight, when a couple of dynamite charges would have settled the matter, and there would be no reason to move at all.

Secondly, it is scarcely conceivable that the enemy should deliberately split himself into three groups each weaker than the force opposed to him, which he saw in action the day before, but which may meanwhile have been reinforced indefinitely. He would, at least, close in his left on his centre first, and the outposts of the Prussians reported troops moving in that direction overnight.

And finally, assuming him guilty of the incredible folly of dividing his forces in presence of the enemy, how long would the detachment persevere in its eastward course when the thunder of the guns warned it of the risk its comrades were running? Not long, after the lessons of 1870, I fancy. If the scouts only cleared a 4-mile radius, the detachment at Luppy would learn that it was not required, and that cavalry would suffice to execute the demolitions, when it would return of its own accord, and be back at Allémont, 5 miles, in an hour and forty minutes, probably striking into the flank and rear of the Prussians assaulting the Bois-de-Ressaincourt.

Moltke, in part, meets my objections, for some of his pupils did elect to "follow the enemy to Buchy," though it does not appear "what they intended to do when they got there."

He says, "But the enemy has a start and can occupy the heights, at any rate, with a detachment which we shall have to attack." Well, if the enemy gets there first, there is an end of the matter, and nothing remains over but to retire to Verny; but nothing was said about their presence in the conditions of the exercise, and since the heights of Buchy are plainly visible from the Louvigny—Vigny ridge, and not 4,000 yards from the latter village, and, moreover, there are 19 squadrons close to Vigny, I absolutely refuse to credit it of the German cavalry, that they would have left such a position and movement unobserved.

If they are there, the game is up; they are between us and the railway and can destroy it when they please, and whether we fall back on Verny or not is immaterial.

Here we may leave this subject and proceed to another exercise.

Amongst those for which maps are available to us in England, there is a simple and instructive one of the use of a flanking position to hinder the advance of a numerically superior enemy.

63*rd Exercise.* 1881. (Plate 7.)

"Metz is threatened with investment.

"3 battalions, 1 squadron, and 2 sortie batteries are observing towards the west of Gravelotte. They report the enemy advancing from Verdun. On the 1st July his vanguard reaches Vionville. Cavalry patrols Rezonville.

"The fortress only receives its full war garrison on the 3rd. The

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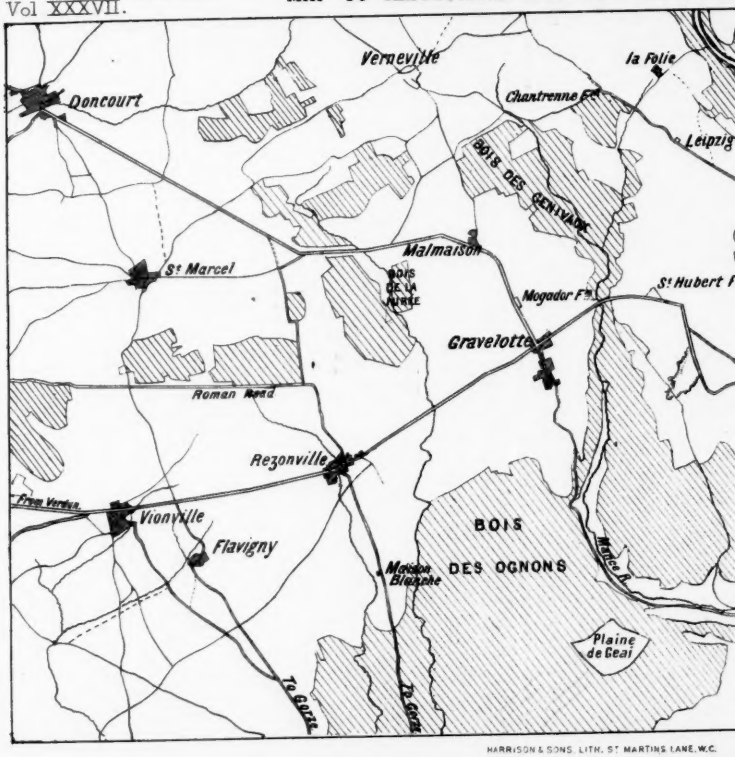
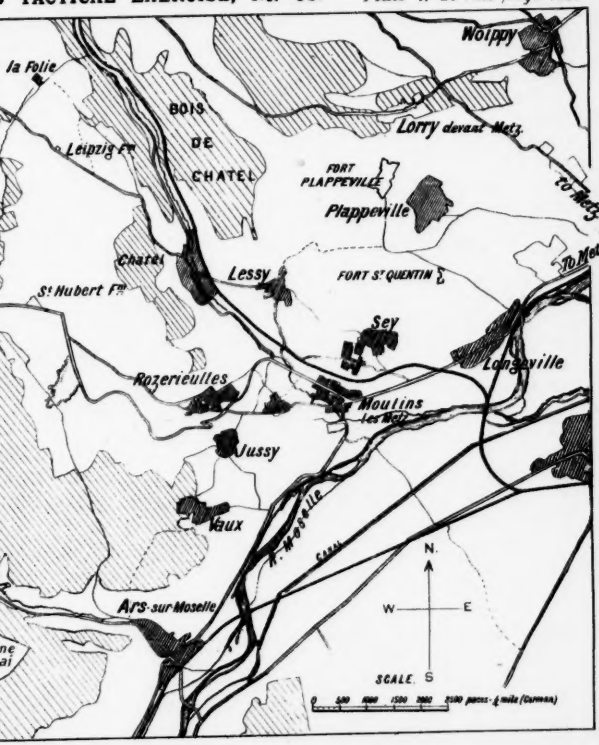
MAP TO ILLUSTRATE MOLTKE'S TACTICAL



HARRISON & SONS, LITH. ST. MARTINS LANE, W.C.

TACTICAL EXERCISE, No. 63.

Plate 7. *To face page 189.*



MARTINS LANE, W.C.

Governor orders the detachment to hinder the enemy from entrenching himself on the 2nd on the Gravelotte plateau.

"How will the Commander best fulfil his mission?

"*Written Solution by General von Moltke.*

"The detachment may oppose the enemy directly on the ridge behind Rezonville, but will find there no support for its flanks, and has the defile of Gravelotte behind it. In presence of the enemy's great numerical superiority, it will soon be surrounded and overwhelmed.

"A position at Gravelotte is better. The enemy will then be compelled to advance either in the fire of our batteries by the road, or in that of our skirmishers across the hollow.

"The defence of the village and its surrounding farms may delay him for hours. But when, at length, the detachment is compelled to retreat, the execution of the rearward movement will meet with great difficulties, and a reconquest of the ridge across the Mance ravine would hardly be possible, even to the full war garrison.

"A flanking position about Malmaison brings the detachment in danger of losing its communications with Metz altogether.

"On the other hand, a similar position along the Bois-des-Ognons, fronting northward, will attain our end most safely. The communications with Metz depend on two bridges at Ars-sur-Moselle. The infantry occupy the edge of the wood; the cavalry, under cover, are east of its northern extremity. The batteries unlimber at the corner of the wood, protected against outflanking undertakings, and take the road across the ravine under fire, whilst skirmishers, sent on in advance, hamper his attempts to cross the bottom of the ravine. Co-operation by the heavy guns of the forts, even at this distance, 6,600 yards, is not excluded.

"The enemy cannot ascertain our strength in the wood, and as long as we maintain ourselves on his flank he cannot secure himself in the possession of the plateau; he must first drive us away. Even after the edge of the wood has been lost by us, a wood fight, under these conditions, where the enemy cannot make his numerical superiority tell, may last the whole day.

"As long as the detachment is not altogether driven over the Moselle during the 2nd, the Bois-des-Ognons secures to the reinforced garrison of the fortress the most advantageous line of advance for the reconquest of the heights.

"*Verbal Criticism by General von Moltke.*

"The question states that Metz is threatened by investment, and that we are to prevent the enemy's gaining possession of the plateau of Gravelotte.

"Now, a weak detachment cannot undertake the investment of such a fortress as Metz; hence we may be pretty certain that he will come in considerable force, 80,000 to 100,000 men. Whether we

have only the heads of columns to deal with; whether he is advancing by several roads, and how many, for the moment we cannot tell; but we may safely assume that we shall have to deal with a marked numerical superiority. An offensive on our part promises no advantages, and may result in catastrophe. We must, therefore, neutralize our weakness by making the most of the advantages the ground offers, and seek out a defensive position.

"The position of the ridge, east of Rezonville, first claims our attention; but the village lies in a hollow, which affords no frontal obstacle; there are no points for our flanks to rest on, and no time for entrenching.

"We may possibly only reach Rezonville simultaneously with the enemy, and, in addition, the position may be turned on all sides. The idea of those gentlemen who have taken up this position is in itself quite right; they wish to compel the enemy to deploy early, and, thereby, gain time, which is of importance. But it makes a great difference whether a strong or a weak detachment attempts this task.

"In the first case, if one compels an army corps on one road to deploy, the operation lasts three to four hours; but here the enemy will, at most, only deploy his advanced guard—five to six battalions, which require but little time—and if we then retire, very little time has been gained; or if we stand and fight, we run the danger of being followed up at once and on a broad front. The enemy may then reach the Gravelotte plateau simultaneously with ourselves, and the idea of withdrawing slowly, showing front repeatedly, is illusory in reality; you may be certain that it will not succeed.

"A second possible position is behind the upper valley of the Gorze stream. The gentlemen who have chosen this position have placed their artillery on heights 956 and 964. That is quite right, for the artillery must go well forward to keep the convex slope of the ravine under fire [heights 956 and 964 are not given, unfortunately, on the General Staff maps of Gravelotte]. But this position is overlooked by the other side of the stream, and in front of the right wing lies the wood, which, with our weak forces, it will be impossible to occupy. If the enemy gets a footing here, he will drive our artillery off with infantry. The right wing is altogether the most threatened one; a long resistance will also, in this case, be out of the question.

"The position Gravelotte—Mogador holds the forces together, and we have time to entrench. The two roads meet at Gravelotte, so that it will be more difficult for the enemy to surround us; but in our rear lies a very formidable defile. If the enemy surrounds our right (assuming that Malmaison is held with troops for observation, which ultimately fall back on Gravelotte), and advances to the hollow way, our retreat becomes impossible; and if we retire to the plateau of St. Hubert in time, even then we sacrifice all chances for a subsequent renewal of the offensive.

"You have, most of you, fully realized the disadvantages of these positions, but, in spite of all, decided to occupy the least bad. I can imagine that you have thought: 'This is a curious sort of exercise,

and no solution is really possible.' I think, too, that no frontal position would meet the purpose, but *perhaps we can evade the enemy.*

"Let us consider for a moment the idea of a flanking position. A flanking position is one taken near to and parallel with the enemy's line of operation; a position which the enemy cannot pass by without endangering his communications, and which he cannot attack without a change of front, bringing his communications in line with the prolongation of his flank, when, even if he does win, the pursuit brings him away from his original destination. At the same time we must also remember that we risk our own communications. A flanking position can therefore only be taken up in our own country, with a friendly territory behind us from which to derive our sustenance. In an enemy's country the situation presents greater difficulties. We turn one of our flanks to the enemy; and hence it is an indispensable condition to secure for this flank a supporting point on the ground itself. Otherwise, our opponent advances along the diagonal and rolls our position up.

"Many of you have selected flanking positions. For instance, one along the Roman Road fronting south. The edge of the wood here is, however, 3,000 paces long, more than our forces can adequately occupy. The right wing finds no other support but the edge of the wood, and the enemy would soon be in possession of its corner.

"If he were to advance carelessly in the direction of Rezonville, perhaps an opportunity might arise to throw his advanced guard in confusion by a sudden attack. But no particular advantage would be gained thereby.

"The same applies to the position at Malmaison; those who have decided to remain there should have made it clear to themselves that they cannot expect to regain Gravelotte by a simple 'left turn—quick march;' perhaps they might get back to Metz by way of Chantrenne and Woippy, but that is always dangerous.

"Somewhat better is a position near Flavigny fronting north, and with retreat by circuitous paths certainly, but still directly behind one. Then the enemy will be compelled to deviate from his original direction, but the plateau of Gravelotte remains completely uncovered. Further, the position is too far advanced and of difficult access. If one goes by the chaussée, one may meet the enemy already at Rezonville, and through the woods there lead but few and indifferent roads.

"There remains, therefore, only the occupation of the northern edge of the Bois-des-Ognons. Gentlemen, imagine the edge of this wood occupied by two battalions in company columns at deploying intervals, with skirmishers in front. One battery in the 4-cornered recess which shelters it from fire from the opposite hill; from here a road goes back straight to the rear. If it turns out to be impassable for guns, then both batteries will find room at the north-eastern corner of the wood. There, too, the cavalry can find room completely under cover; for the present it naturally will remain at Rezonville in observation.

"The position answers the requirements of a flanking position. Behind it, besides the roads through the woods, lies the chaussée to

Ars where two bridges exist, and the left flank finds support on the Gorze ravine. You will say, 'But Gravelotte remains entirely open, and whilst he is attacking us, he can overrun the whole plateau.' That is quite true, but he will not possess it. As long as he must expect every minute to be attacked from the wood in flank, he can neither bring up artillery nor his engineer park to the plateau. A possible occupation of the plateau of St. Hubert is not to be feared; there he would come right under the guns of the forts. The enemy cannot avoid attacking us; he will advance on both sides of the road across the hollow, and then change front to the right under the fire of our artillery, and proceed to the attack of the edge of the wood which we shall have had ample time to strengthen.

"I presume that the enemy will first form up under cover in the hollow, bring up his artillery and wait till sufficient forces have arrived to attack our left simultaneously with our front.

"If we lose the boundary of the wood, we must fall back to the bend in the chaussée, when a completely parallel fight will ensue in this wood which, owing to its dense undergrowth, is difficult to get through. The paths which lead to it are simply continuous defiles; the enemy, therefore, can make no use of his numerical superiority, except for closing up the gaps in his front. But we also have a battalion in reserve. Cavalry and artillery cannot be employed until his skirmishers have reached the wood, and with the deep ravines to the right and left of us, we are secure against the danger of being surrounded.

"The fight is therefore on parallel fronts, and only a gradual and difficult step by step progress possible for the enemy. Thus the fight will spin itself out till dusk, and if we only maintain the southern border of the wood, we can assume the offensive thence next morning. At any rate, it will be easier from this as starting point than across the Gravelotte ravine. This is the best solution of this difficult problem."

To anyone reading the above without the map, nothing can be clearer than the conception of a flanking position and the conditions it should fulfil. But when one takes the map and compasses in hand, the possibilities of execution become somewhat doubtful.

In the first place, the map shows that the edge of the wood, to be defended and strengthened, lies below the shoulder of the hill, and the defenders cannot see more than 200 yards to their front. If they go forward to the west of the ridge, the convexity of the slope still hides the great hollow in front, and the prolongation of the line falls on the Rezonville—Maison Blanche ridge not 1,000 yards south of the former place. How long could infantry exist in this position swept from flank to flank by shrapnel at its most effective range?

With regard to the defender's guns; in the "4-cornered recess" above mentioned, they also cannot see the road; but assuming my reading of the map and recollection of the ground—pretty distinct by the way—to be both wrong, then the road runs parallel across the front at 1,200 to 1,300 yards, and at the first gun the infantry will be in the

ditches, pouring long-range volleys into the batteries, whilst the advanced guard batteries from the south-east corner of Rezonville take them in flank. It must be remembered that there was no smokeless powder in 1881.

Next, assume a hostile corps to blunder along the road, no cavalry in advance, and plot the positions of the units along the road in column of march. At the first gun, as already mentioned, the words "halt," "front," bring the leading companies in line in the road ditches, in the best possible order to make use of their rifles, the following battalions bend off northwards from the road and form in the hollow immediately to the north of it. The divisional batteries deploy south of Rezonville, reinforced by the corps artillery, which trots forward across the fields; the remainder of the leading division bends off southward by saddle 945, forming under cover of the Maison Blanche ridge, and the 2nd Division takes from Vionville the Flavigny—Gorze road to Ars, distance about 9 miles—four hours' march, at the outside.

As to the impracticability of the woods and their slopes, the Germans managed them on the 16th August, 1870, and I do not see why the French should not do so now, or in 1881, for that matter.

If this flank must be held, the position would seem to me to run from the south-east corner of the recess in the northern edge of the wood, along the track to the Plaine de Geai. A slashing, made after the fashion of the Americans in the Civil War, might here prove a very formidable obstacle indeed, and the extent of front is no greater than what Moltke himself proposes to hold across the wood from west to east, and, with a reasonably clear field of fire to either flank; it is more secure than the west to east position resting on ravines, through which both French and Germans managed to fight their way in the last campaign.

With all due diffidence, it is submitted that the Malmaison position offers much greater advantages. Its danger lies in its exposed outer flank; but here the country is open, and cavalry can scout. News of a possible turning movement by St. Marcel will be received in ample time, whereas the Flavigny-Gorze movement is certain to escape detection.

The only space on which to develop artillery against Malmaison is along the Gravelotte road, with the flank directed almost on the Plappeville guns and well in reach of 64-pr. shells.

A judicious entanglement of the Bois-de-la-Jurée lisière will hinder the *débouchée* of infantry, and compel them to come up the hollow, which affords almost a minimum of cover, and, finally, when retreat becomes unavoidable, the Bois-des-Genivaux, and thence between La Folie and Leipzig into the Bois-de-Chatel, eventually by Lorry, offers a line which cannot reasonably be cut, and gives the guns of the forts ample opportunity to intervene; range about 5,000 yds.

There are a few other points wanting in clearness in the original. Why, for instance, should the enemy advance "on the road," in the fire of our batteries? "To evade the enemy" would be easy enough, but the object is to fight him. The front of the Bois-des-Ognons is also

3,000 paces; why, therefore, should 3,000 paces along the Roman road be too great an extension for the same force, and where is the "chaussée" with the bend in it? The central track through the wood from north to south is a mere track. Moltke himself questions its practicability for artillery, and the chaussée in the valley to the eastward can hardly be meant; neither does it present an accentuated bend.

I call attention to these points because I have always been accustomed to hear from Moltke's ex-pupils unreserved praise of the clearness and lucidity of his style. Similar instances will be found in his other exercises, and one is tempted to believe that it was his reputation and charm of manner, particularly his modesty, which overshadowed his hearers' judgment.

Generally, when the history of the last thirty years comes to be written, with access to Government Archives, without which it can never be properly understood, I am inclined to believe that Moltke's influence on the German Army will be found markedly less than popular opinion supposes.

This is specially the case with regard to his appreciation of the relative values of the attack and defence as forms of action. Throughout the present work his leaning to the latter is very evident, and, on p. 104, he formally expresses his opinion in the following words:—

"It is my conviction that the improvements effected in fire-arms have given the tactical defensive a marked advantage over the tactical offensive. It is true, we always acted on the offensive in 1870, and that we attacked and carried the strongest positions of the enemy; but, gentlemen, with what sacrifices? To beat off several attacks of the enemy and then assume the offensive seems to me the better course." And elsewhere, alluding to the same subject, he says that only their numerical superiority justified the offensive.

The ruling authorities of the German Army have not accepted this principle, for the reason that the premises have been shown to be incorrect.

Even taking the losses as they occurred, it is well known that they were below the percentages of the battles of Frederick the Great's and Napoleon's era, and markedly less than in the American Civil War. Eliminating the exceptional cases, such as that of Wedell's brigade, the Guards at St. Privat, and others, in which the heavy loss can be shown to be strictly due to bad tactical handling, failure to reconnoitre adequately, over-hastiness in attacking before the artillery had prepared the way, &c., I do not believe one single instance of a percentage of 20 occurring in any body of troops consisting of a regiment and upwards, and incurred in a single attack, can be indicated; and, even if it could, it should be remembered that between well-matched enemies the losses endured in a victorious attack are simply the measure of the discipline of the troops executing it. Thus, whereas a single regiment of first-class troops (three battalions), capable of standing up to 40 per cent. of loss, might suffice to carry a position held by a given enemy, a whole army corps of troops, capable of bearing only 10 per cent., might be necessary to accomplish the same service.

Further, the recent military statistical enquiries published by the General Staff have considerably discounted the idea that it was to numerical superiority alone that the Germans owed their victories; and, finally, if the improvement in firearms has produced so great an effect, it is astonishing, truly, that Moltke should overlook the disparity between the weapons of the German infantry and those of their opponents. Correct the losses for this factor, which in itself was the fundamental cause of the tendency to over-hastiness in attacking and of the extraordinary dissolution of order and cohesion in the German fighting lines, and the percentages will compare even more unfavourably than they actually do with the losses hitherto believed to be inseparable from the collision of armed forces in battle.

That the "defensive-offensive is the strongest form," is an old Clausewitzian maxim, but Clausewitz qualified it by adding, "but it is the most difficult of execution," and it is obvious that the difficulty must increase very rapidly with the numbers to be moved, a point to which Moltke never alludes.

I have ventured to call particular attention to this point, as the idea of the power of the defensive has attained a most dangerous hold in our own military literature, which is likely to be strengthened by this dictum of Moltke's. Our military history, on the surface, tends to confirm this view; but, if studied more closely, it will be seen that we have owed our success in this particular form to causes not of universal application. Under the old Duke we could confidently expect to beat off several attacks of the enemy and then assume the offensive, because we had an army very markedly superior in discipline (on the battle-field) to any in Europe at the period. Moreover, the numbers were small, and the distances at which reserves could be held in readiness in those days were immaterial. But in tactical discussion it is not safe to base a method of employment on the assumption of superior courage on our own part. The conditions must be assumed equal, and, where that assumption is made, these deductions necessarily follow:—The greater the numbers, the greater the advantage of the initiative; the greater the power of the weapons, the more rapidly will they accomplish the work of preparation. The time, therefore, available for bringing up reserves is decreased, whereas the time necessary for the actual delivery of the assault remains practically invariable, and is dependent only on the ground. This, of course, does not preclude, under certain conditions, the defensive as a means to gain time for the arrival of reinforcements, &c.; but when two armies meet to decide a campaign by battle, in normal ground, it is my conviction that the adoption of the defensive will inevitably result in disaster.

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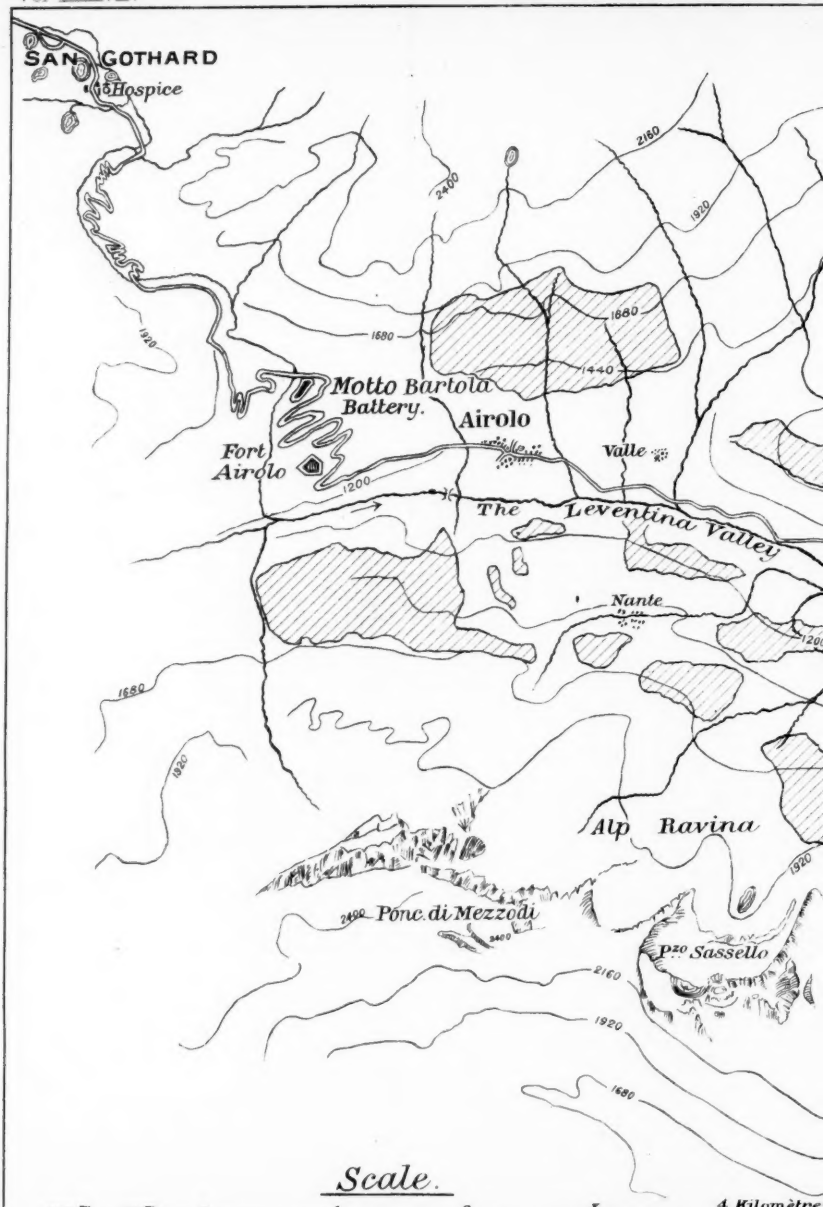
MAP TO ILLUSTRATE CAPTAIN



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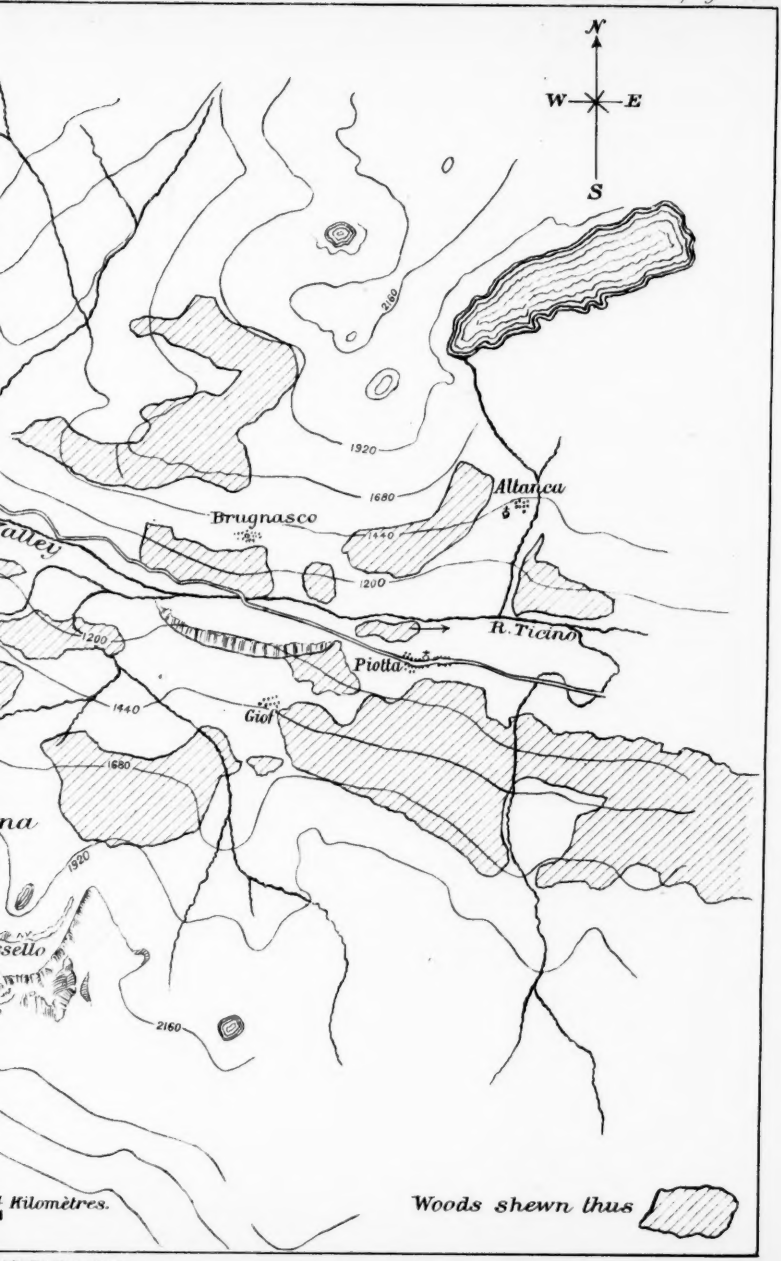

LITH. ST MARTINS LANE W.C.

FIELD-FIRING OPERATIONS OF A MIXED FORCE IN SWITZERLAND IN CONNECTION WITH THE DEFENCE OF THE ST. GOTHARD.

Translated from the "Revue Militaire Suisse," of October, 1892, by Captain E. AGAR, R.E.

WE borrow the following correspondence from the "Gazette de Lausanne":—

You have recounted the extraordinarily daring experiment carried out by the artillery of position in hauling 12-cm. guns up to the summit of the Gourschen. I wish to-day to give you details of an experiment of a somewhat different nature, in which I took part last week, on the same ground, and which appears to me, in all respects, to merit attention. It consisted of a field manœuvre, carried out against an enemy marked out by targets, by a detachment of combined troops, provided with ball ammunition and live shells.

Colonel of Brigade Gallati was in command. He had under his orders the 87th Battalion of *élite*, from Uri; the 3rd Landwehr Field Battery, from Lucerne; the 1st Fortress Company of Artillery, from Airolo; the 6th Landwehr Company of Sappers; and a second company of sappers, formed from the pioneers of the Landwehr infantry of the 5th Division. You will notice that it is rather a strange mixture: the Landwehr and the special arms are in the majority, which would be difficult of explanation in the case of operations in a flat country, but which is quite natural in the case with which we are now concerned, in which we have to deal with troops detailed for the defence of the fortified district of the St. Gothard.

The general idea was as follows:—

A detachment of the enemy (indicated by targets) is about to ascend the Leventina, with Airolo as its objective. It occupies the front Altanca—Piotta—Giof, and is endeavouring to take possession of the heights of Brugnasco and of Nante, which command the fort at Airolo. A Swiss detachment is sent against it with the object, under the protection of the artillery of the fort, of arresting its further march.

Naturally it was impossible to indicate by targets the centre of the enemy's line, which was situated at the bottom of the valley. One could not venture to fire with ball cartridge, or with live shell, in this particular neighbourhood, through which pass the main road and the railway, and where the dwellings are very numerous; but the barren knolls, and the spurs of the mountain, had been all the more carefully made use of.

The enemy's principal attack, on the assumption given above, could only be directed against the Alp Ravina, to the south of the Ticino.

This Alp, which is in the shape of a square with sides of about 2 km., rises in an abrupt slope to 400 m. above the valley road. It is almost hermetically closed towards the south by the rocky crest of the Pizzo Sassello, and to the east by a spur of the Poncione di Mezzodi. In order to take possession of the heights and of the village of Nante, opposite Airolo, one must necessarily cross it throughout its length. The ground, intersected by moraines, is interspersed with clumps of trees which may, to a certain extent, mask the movements of troops, but which, however, nowhere form a very thick screen; it would be difficult to escape from the view, and from the attacks, of a vigilant adversary.

It was on this Alp Ravina that the principal forces of the enemy, in the form of targets, had been placed; they were supposed to be crossing the Alp in attack formation, in the direction of Nante. They comprised the following:—A battalion of infantry deployed, with groups of skirmishers in front, the latter partly concealed by folds of the ground and by trees; further in rear the supports, in one rank, standing; finally, the principal line, composed of companies in line; on each flank a battery supporting the infantry with its fire—on the right a field battery, on the left a mountain battery. All the targets, which were of wood, were painted, and represented men in different attitudes; lying down, kneeling, or standing. On the northern slope of the valley, along the mule road which joins the villages of Brugnasco and Altanca, there had also been placed a detachment of the enemy of the strength of one company.

The first task presented to Colonel Gallati's troops was to prevent the enemy, who were supposed to be still on the march at some distance away in the bottom of the valley, from taking possession of the exterior defences of the fort at Airolo.

With this object the 87th Battalion had placed its advanced posts, on the evening of the 13th September, on the heights of Nante. Two sections of the Landwehr Battery No. 3 occupied a terrace to the east of the village. From Airolo to Nante there exists in truth nothing but a mule track, which is very steep, and which seems scarcely practicable, except for mountain artillery. But the pioneers had quickly improved this road, and the battery bravely breasted it. In three hours they had succeeded in bringing on to the height the four guns, thanks to the incomparable ardour with which the gunners and the sappers had come to the assistance of the horses. An enthusiastic spectator remarked with justice, "It is mountain artillery with two-legged mules."

The two other guns of the battery had been taken from Airolo to Brugnasco *viâ* Valle. The difficulties had been even greater. At a certain spot it had been necessary to dismount the guns and to drag them up by means of sledges, greatly assisted by manual labour. The company of sappers acted as a support to this artillery.

On both sides of the valley, observation-posts had been established. The Officer in chief command had taken up his position on a large rock to the south-east of Nante, from which the view extends for some distance, and which is called in the country the Costone. The

posts communicated with each other by means of visual signalling. Besides this, telephone lines, installed by the engineers, connected the Commanding Officer with Fort Airolo and with the positions occupied by the field artillery.

On the morning of the 14th September, the 87th Battalion and the pioneers of the Landwehr infantry occupied the slope to the south-east of Nante, the pioneers facing the Alp Ravina at the foot of the Costone. They had with them the machine-gun section of the fortress artillery.

These machine-guns, like the chassepôts at Mentana, do wonders. The fortress gunners who have the working of them are chosen for their powerful build. They transport these machines on their broad shoulders wherever a man can pass; no goat track seems to be too steep for them. In two minutes the Maxims are mounted and ready to open fire. You know that they fire 600 bullets a minute with great precision. A piece of rock of moderate dimensions suffices to shelter the gun and the two men serving it, one seated, the other kneeling. When the position becomes untenable, they pack up and move off. This machine is a valuable support in the hands of experts.

To return to our manœuvres. At 9 o'clock fire was opened. It is supposed that at this instant the enemy has reached the positions where the targets are placed, and that he has accentuated his offensive movement.

This movement must be arrested. The infantry pioneers and machine-guns take, as their objective, the line of skirmishers; whilst Fort Airolo and the battery at Nante cannonade the artillery and the main body of the hostile infantry. In the meanwhile the sappers make head against the detachment on the left bank of the Ticino, and the two guns at Brugnasco fire obliquely on the positions of the Ravina Alp.

The fire, increasing in intensity, lasts for an hour, the deep roar of the guns of the St. Gothard mingling with the sharper reports of the infantry fire. Then comes the decisive attack. It is the 87th Battalion which has to carry it out. A heavy, quick fire from all the guns precedes it. In spite of a somewhat long range, more than 5,000 m., the shells of the fort fall with remarkable precision in the lines of the hostile artillery, whilst the Landwehr battery, at a range of 2,000 to 2,500 m., covers the infantry targets with shrapnel shells.

The projectiles whistle in the ears, or pass over the heads of, the infantry soldiers of the 87th and of the Landwehr pioneers, but not a man stirs, so much does the accuracy of the artillery fire inspire confidence. All the same, when the battalion from Uri makes a turning movement round the left wing of the enemy, some of the last shrapnels from Brugnasco burst almost in their lines, fortunately without wounding anyone.

At 11 o'clock the manœuvre is over. It has been favoured throughout with superb weather, and no accident has occurred.

It is stated that the results of the firing were very successful The targets were riddled with bullets and with the fragments of

shell, and in several places were reduced to match-wood. Without doubt on active service one could not reckon upon similar results; one would have to make considerable reductions, in order to make allowance for factors which must necessarily be neglected in firing in cold blood against immovable targets. It is none the less true that field exercises carried out with actual service ammunition are a schooling for the troops which one cannot value too highly. Nothing is more suitable for inculcating into our foot-soldiers that fire discipline, which it is so difficult to obtain, and which is of such vast importance. As to the danger, if it exists to a certain degree, it can be reduced; and then, again, it is an exercise of inestimable value for habituating the different arms to act in concert without difficulty and without impeding one another.

However this may be, a manœuvre with combined troops, executed throughout with live ammunition, the artillery firing over the heads of the infantry, is, I believe, a novelty in our country; it is on these grounds that I felt it my duty to write to you I will not lay stress upon the performance of the field artillery, although it borrows a special interest from being due to the Landwehr. I have no doubt that our *élite* batteries, bearing in mind that our country is three-fourths mountainous, would soon do even better.

NAVAL AND MILITARY NOTES.

[In the Naval and Military Notes it is intended to summarize any important information regarding the home, colonial, and foreign Services that may have appeared in the home and foreign press during the preceding month. In this way it is hoped that the Journal may in time become a useful work of reference, especially in view of the fact that many of the papers from which it is proposed to glean the information can rarely be consulted by officers at sea or at out-stations.—Editor.]

NAVAL.

Home.—The stranding of the "Howe," one of the battle-ships of the Channel Squadron, on the 2nd November, on a shoal not marked on the chart, when entering Ferrol Harbour, adds another to a somewhat long list of similar mishaps, which have, so unfortunately for the Navy, marked the past year. In the case of the other ships, although the "Victoria" and "Warspite" both received a certain amount of damage, yet the repairs were easily effected at Malta and Esquimalt respectively, and no permanent harm has resulted; we are sorry to say, however, that at the time of writing the "Howe" still remains on the rocks. Great hopes are entertained that she will soon be floated, but the work of planking over the serious rents in her bottom has proved more difficult than was anticipated.

Satisfactory progress has been made during the past year in the construction of the ships ordered to be built under the Naval Defence Act of 1889. The following ships have been launched, viz.:—1st Class battle-ships, "Ramillies," "Repulse," "Revenge," "Resolution," and "Royal Oak." These ships are all of a similar type to the "Royal Sovereign," which was commissioned last June as flag-ship in the Channel; 2nd Class battle-ships, "Barfleur" and "Centurion." 1st Class cruisers, "Crescent," "Gibraltar," "Grafton," "St. George," and "Theseus"; 2nd Class cruisers, "Æolus," "Bonaventure," and "Scylla," and the torpedo gun-vessels, "Circe," "Hebe," "Leda," "Jason," "Alarm," "Jaseur," "Renard," "Niger," and "Onyx." The armament of the ships launched in 1892 will consist of 20 13·5-in. guns, 8 10-in., 9 9·2-in., 108 6-in., 56 4·7-in., 180 6-prs., 127 3-prs., and 101 machine-guns, or 609 guns in all, with 108 torpedo-ejectors.

The following 2nd Class cruisers, ordered under the Naval Defence Act, have also been completed for sea and placed in the Fleet Reserve, viz.:—The "Andromache," "Melampus," "Indefatigable," "Latona," "Naiad," "Terpsichore," "Thetis," "Tribune," "Spartan," and "Rainbow," while another, the "Sirius," has been commissioned for service on the south-east coast of America. The steam trials of these new cruisers have been uniformly most successful, nearly the whole of them having reached a speed of over 20 knots under their forced draught trials, while the difficulties with regard to the tubes of the boilers seem to have been overcome by the new system of ferruling the ends of the tubes.

The Admiralty have adopted the plan of ordering ships home from stations within a moderate distance of England to receive their new crews when they are to be recommissioned for a further term of service abroad: the ships will not undergo any refit in the home dockyards, but will return to their proper stations for such refit and repairs as are necessary. Accordingly the "Canada" has arrived from the North American station, and having received her new crew will return in a few days to Bermuda, where she will dock and refit.

The "Cleopatra" has been commissioned and taken the place of the "Emerald" on the North American station; the "Phœbe" goes to the West Coast of Africa; while the "Beagle" and "Pelican" have been recommissioned at Bermuda, the "Nymphe" and "Daphne" at Esquimalt, and the "Mercury," "Alacrity," "Caroline," "Pigmy," and "Redpole" at Hong Kong.

An alteration is being made in the armaments of many of the battle-ships and cruisers by the substitution of 3-pr. Hotchkiss for 1-in. Nordenfelts.

It is stated that the Admiralty lately asked for competitive designs for mounting a pair of 50-ton guns in the barbettes of the new battle-ships it is proposed to build, and that they have accepted that of the Armstrong Co. at Elswick. The new design embraces a number of novelties and improvements of the most important nature. The following are some of the interesting features of the design:—

1. It will be possible to fire both guns at intervals not exceeding 1½ minutes.
2. Every operation can be performed by hand as an alternative.
3. The guns can be loaded in any position or in a fixed position. Consequently, if one gun only has been fired it can be reloaded, although the other gun is being kept bearing on the object.
4. Superior protection is given to guns and crew.
5. It has been possible to reduce proportional horse-power of the hydraulic pumps to a very great extent.

In December some important experiments were carried out with smokeless powder at the range of the Elswick firm, at Silloth. The powder has been invented by M. St. Marc, a Captain in the French Territorial Army, and the trials were carried out under his personal superintendence. The base of the smokeless powders hitherto invented has usually been nitro-glycerine, which begins to "sweat" and becomes dangerous when the temperature goes below freezing point. Another objection to former inventions of the kind has been that the powder would not keep. M. St. Marc claims that his powder will keep in all kinds of weather, that it will not become dangerous, that it is perfectly smokeless, that it heats the gun much less than any other powder yet manufactured, is very dense, and burns slowly. His powder has for its base an unchangeable substance procured by the chemical admixture of six ingredients. In one of the trials at Silloth this powder was tried with a Hotchkiss Q.F. gun, and the most satisfactory of the tests showed that with a charge of 5 ozs. a projectile weighing 3·3 lbs. left the muzzle with a velocity of 1,935 ft. a second; while it appears that with ordinary powder, and a Hotchkiss gun of similar calibre to that used in the experiment at Silloth, a projectile weighing 3 lbs. 8 ozs. leaves the muzzle with a velocity of 1,998 ft. per second, but with a charge of nearly 1 lb. 3 ozs. of powder. With M. St. Marc's powder, after 20 shots have been fired, the temperature of the gun is raised about 35° Centigrade, whereas it is stated with other powders the temperature is raised about 5° per shot.

One of the most interesting armour-plate trials in this country took place in the early part of November on board the target-ship "Nettle" at Portsmouth. Hitherto the tests have been confined to all steel and compound armour-plates manufactured by English makers, but in this case the plate was of a nature new to Europe, and manufactured in accordance with an American patent. It is now well known that what is termed the high-carbon nickel Harveyized armour has, after exhaustive experiments, been adopted by the American Government as the special protection for their ships-of-war. In his Annual Report for 1891, the Secretary of the United States Navy referred to it as being "undoubtedly the best armour-plate ever subjected to ballistic test;" while the Chief of the Bureau of Ordnance summed up the result of a long series of competitive trials at Indian Head, Maryland, in the following words: "The Bureau considers that two important results have been achieved: first, a better plate of American manufacture has been produced than the Department was able to purchase abroad a year ago; secondly, it has developed a new principle in the manufacture of armour of American origin,

which there are good grounds for believing will provide greater protection to the vital part of vessels of war than any other system hitherto employed." The results of the firing were also reported to Congress by the Committee on Naval Affairs in these words: "The Harveyized nickel plate, subjected to tests at Indian Head, open to the scrutiny of the world, has proved to be the best plate ever manufactured."

It is now about five years ago that Mr. Harvey turned his attention towards the improvement of armour-plates, and it really seems as if during his experiments he must have come across an elementary law of nature, and that he has discovered a treatment which allows the molecules of the iron to unite with the atoms of the carbon in a manner and to a degree which enables the surface so treated to take the greatest possible amount of hardness, the treatment at the same time causing an ununiform crystallization which gives no direct line of cleavage. The plates recently tried have all been manufactured of mild steel, about 0·25 per cent. of carbon, but, being in one solid mass, the treated and untreated portions are so incorporated, that whereas the treated surface pulverizes the projectile, which could easily pierce the softer portion, the latter in its turn will not permit the harder portion, from its being so intimately combined with it, to crack or show the brittleness which usually characterizes extreme hardness.

After the reports of the trials in America were published, it became necessary for our Admiralty to verify the results for themselves, and with this object they entered into negotiations with the agents of the Harvey Steel Company of New York. Messrs. Vickers and Co., Sheffield, were eventually commissioned by the Government to manufacture a nickel-steel plate, a representative of the Harvey Company superintending the treatment of the plate by the new process, and this was the plate tested on board the "Nettle." The plate measured 6 ft. by 8 ft., with a thickness of 10½ in. Its dimensions were consequently the same as those of other sample plates tested on board the "Nettle." The test for purposes of comparison was of the ordinary character consistent with Admiralty conditions. This consisted of discharging five rounds at the target from the 6-in. breechloader. The charge was 48 lbs. of E.X.E. powder, the weight of projectiles 100 lbs., and the muzzle velocity, 1,975 ft. per second. The rounds were fired in the following order:—(1) Holtzer steel shell at bottom right-hand corner; (2) Holtzer at upper left-hand corner; (3) Palliser shell at upper right-hand corner; (4) Palliser at upper left-hand corner; (5) Holtzer in the centre.

The result of the firing was an astonishing success, and completely verified the accuracy of the reports received from America with reference to the merits of the Harvey hardening process. Contrary to ordinary experience, the Palliser projectiles appeared to do as much execution as the French shells, for, although they splashed upon the plate on impact, they made indents of about 1½-in. in depth. The Holtzers, on the other hand, appeared to weld their points into the target before bursting into a thousand incandescent fragments. Every one was completely pulverized. The most remarkable feature of the trial, however, was the fact that the plate withstood the attack so well that not a single crack was produced, a result which is perfectly unique in armour-plate trials. It is probable that as a result of the trial the Admiralty will order the armour plates to be Harveyized in future. As this 10½-in. plate is said to be quite equivalent to many 15-in. plates of former times, a much larger portion of a ship will be able to receive protection, or if this is not deemed necessary, there can be an increase in the coal capacity, and consequently increased steaming radius.

It is said that Mr. Harvey has taken out other patents, including one by which intense hardness can be given to projectiles, so that it is quite possible that in the long run the gun may yet remain the master of the plates. Since these experiments on board the "Nettle," some further ones with Harvey plates have been carried out by the Russian Government at Ochta, but we must refer to them on another occasion.

Austria-Hungary.—The Austrian Naval Estimates for 1893 reach the sum of 9,688,280 fl. on the ordinary charges, being an increase of 303,666 fl. Under the

heading of "Ship-building" are included the last instalment for the ram-cruiser "Kaiserin Elizabeth," 100,000 fl. for alterations to the "Tegetthoff," the first charge for special work upon the "Erzherzog Albrecht," the first charge also (460,000 fl.) for the coast-defence ship "Ersatz Habsburg" (5,500 tons), of which the total cost is estimated at 3½ millions of florins; 60,000 fl. (towards a total of 160,000 fl.) for the "Miramar," and a first grant (one half) of 100,000 fl. for new engines for the Danube monitors, "Maros" and "Leitha." The Extraordinary Naval Estimates reach the sum of 2,289,400 fl.—an increase of 146,300 fl.—and include the fourth instalment (800,000 fl.) for the ram-cruiser "C," the third instalment (20,000 fl.) for the Danube monitor "Szamos," and the third also (170,000 fl.) for the torpedo-cruiser "Satellit," and 30,000 fl. for a patrol and scouting vessel for the Danube, and the first charge (350,000 fl.) for the coast-defence ship "B." There is also a grant for the armament (including 15-cm. quick-firing guns) of the ram-cruiser "C," the "Tegetthoff," and the "Satellit." The two coast-defence ships for which provision is made are of a type new to the Austrian Navy.

Germany.—The Schichau firm in Elbing have scored another great success with one of the new torpedo-boats they are building for the Italian and Russian Governments. This boat, during a run in the open sea, maintained for an hour the extraordinary speed of 27·4 knots, a speed far in excess of anything that has been reached up to the present time. The dimensions of the boat are as follows:—Length, 152 ft. 6 in.; beam, 17 ft. 5 in.; displacement, 130 tons; stowage of the bunkers, which are placed so as to protect the boiler on both sides, 40 tons. The greatest thickness of the deck and side plating is 0·226 in. The pressure in the boilers is 13 atmos., or 7·4 kilos., upon 1 sq. cm. At the time of the trial there were on board—20 tons of coal; torpedo equipment, 6 tons; guns, 2½ tons; crew, provisions, ammunition, &c., 4½ tons; water, 2½ tons; and other stores, making a total weight of 40 tons. During the run at sea a speed of 26·5 knots was easily maintained, and for one hour 27·4 knots was kept up. The revolutions of the screws were 325.

A new and patented process for the automatic and smokeless combustion of coal is said to be creating a great sensation in Berlin, and is likely to cause quite a revolution in the methods hitherto employed for the production of the motive power of steam machinery of all descriptions. A company has been formed for working the patent, and contracts made with the North German Lloyd, the Hamburg American Packet Company, Schichau, and the Vulcan Works at Stettin, for the introduction of the new system. The new system briefly described is as follows: The coal is first pulverized in centrifugal pulverizing mills, and is supplied to the furnaces by means of a current of air. The ordinary fire grates, fire bridges, &c., are removed from the furnaces, and a movable pear-shaped fire chamber lined with fire brick, in which is a small fire for the purpose of starting the combustion, is fitted to the closed furnace fronts. The coal dust is supplied to this fire chamber by means of a hopper at its upper part and is delivered to the furnace by being met with a current of air supplied through an aperture in the side of the chamber; the supply of coal dust being thus continuous, it is ignited on coming in contact with the small fire in the fire chamber and continues to burn with a regular and intense flame. A further supply of air necessary for complete combustion is admitted into the zone of combustion in radiating jets, so that by this means the coal dust and the air are intimately and thoroughly mixed, and each particle of coal dust is immediately and perfectly consumed; this is proved by the fact that there is not a trace of smoke perceptible. The heat of combustion may be still further increased by heating the air before supply to the furnaces, or by mixing with it a supply of superheated steam. By this system of continual and automatic feeding, the supply of coal dust and draught can be regulated to the greatest nicety by hand, and the influx of cold air to the furnaces entirely prevented; while at the same time the greatest uniformity in the generation of heat is secured. Amongst other advantages of the system may be mentioned, the ability to start and stop the fire instantaneously, the absence of

grates, fire bridges, &c., and of all cinders and ashes, and the possibility of doing away with the high chimneys now necessary. It is also claimed that the system can be used for all kinds of welding and smelting purposes, &c., and that brown coal, charcoal, turf powder, &c., may be burned as well as ordinary coal of all descriptions.

Italy.—The Italian battle-ship which is building at Venice, and to which the name "Ammiraglio di Saint Bon" is to be given, in recognition of the great services of the late Minister of Marine, is of a new type, and will have a displacement of 9,000 tons, a length of 344 ft. 6 in., a beam of 69 ft. 3 in., and an extreme draught of 24 ft. 8 in. With forced draught she will develop 13,500 H.P., with a speed of 18 knots; with natural draught a speed of 16 knots is expected, with an expenditure of about 9,000 H.P. There is an over-all protective deck of steel, varying in thickness from 1½ in. to a little over 3 in. An armoured citadel in the middle of the vessel and the armoured belt will carry plates varying from 4 in. to 9¾ in thick. At each end of the citadel will be a turret, armed with two 9·9 in. guns. Elsewhere, with suitable shields, will be mounted eight 5·9-in., eight 4·7-in., four 2·2-in. (6-prs.), and twelve small quick-firing or machine guns. The coal carrying capacity is to be 1,000 tons. Two similar vessels are ordered to be built, one at Spezia and the other at Castellamare. Each will have twin screws, traverse armoured bulkheads, and every modern improvement in machinery and water-tight subdivisions. The definite abandonment of the over-large gun by the Italian Navy, which was first adopted for the "Duilio," launched in 1876, is noteworthy. No Italian ironclad built since 1885 carries a gun of greater weight than 68 tons.

Russia.—The new Russian battle-ship "Dwjenadzat Apostolow" (Twelve Apostles) has been undergoing her steam trials in the Black Sea. At her normal draught it was expected a speed of 17 knots would be obtained with an indicated horse power of 8,500, but the engines only developed 8,000 H.P., giving a speed of 15·5 knots; a few days later, however, during a six hours' run against a fresh breeze and some sea, with the same indicated H.P. she attained a speed of 16·6 knots. The inexperience of the stokers and the badness of the coal are assigned as the reason why the engines failed to work up to the expected I.H.P. of 8,500. Her machinery, which was constructed at the Baltic Works at St. Petersburg, worked satisfactorily throughout. Another new battle-ship, the "Tri Swjatitelja" (Three Saints), has been commenced in the dockyard at Nicolaieff, in the Black Sea, and will be the largest battle-ship yet built for the Russian Navy. She is to have a displacement of 12,500 tons, and is to be ready for launching in the autumn of 1894. Her type is quite new, but she stands about midway between the low free-board ships of the "Peter-Weliki" class and the new high free-board ships of the Black Sea Squadron. With regard to her plating and armament, she will resemble the "Dwjenadzat Apostolow," but will be much more powerful. With the exception of the "Popoffkas," she will be the first ship in the Black Sea with covered revolving turrets (two). In spite of her great beam and stability she will, on account of the great weight of the turrets, be unable to carry them so high out of the water as the barbettes of the other Black Sea battle-ships, and the ends of the ship will also be lower. In place of the spar deck of the "Dwjenadzat Apostolow," she will have an armoured casemate, and there will be many improvements in other details. Her engines, which are to develop 20,000 H.P., will be supplied by Messrs. Humphrey, and her guns by the Obuchow Works at St. Petersburg, while the turrets and hydraulic fittings will be from the works of the St. Petersburg Metal Company. The building steel will be supplied by the Briansk factory, but the contract for the armour-plates has not yet been given out. The new battle-ship "Gangud" has proceeded from St. Petersburg to Cronstadt, but her steam trials have not yet been carried out. Her principal dimensions are as follows:—Length between perpendiculars 289 ft. or 302 ft. 6 in. including her ram, a beam of 62 ft., with a displacement of 6,628 tons. Her engines are expected to develop 6,000 H.P. under natural draught, with a speed of 14 knots, and 9,400 H.P. under forced draught, with a speed of 16·5 knots. She is partially armoured with a water-line belt of 16-in. compound armour running two-thirds of her length. Her armament consists of one 12-in. gun of 30 calibres, mounted forward in a

turret plated with 9-in. compound armour; four 9-in. guns of 35 calibres mounted on the battery deck in casemates of 8-in. armour; four 6-in. guns of 35 calibres, also carried on the battery deck, two forward and two aft; and four 3-pr. and fourteen 1-pr. quick-firing guns; and there are also six above-water torpedo discharges. The hydraulic machinery for the 12-in. guns is manufactured at the Putilow Yard, after designs by the Canet firm.

A new type of torpedo-boat has been designed by Lieutenant Beklemischew, and two vessels of the class are now under construction at the Putilow Yard. They are to be named the "Moonsund" and the "Hapsal," and are of the following dimensions: length, 126 ft.; beam, 12 ft.; draught forward, 3 ft. 3 in.; draught aft, 8 ft. 6. The indicated H.P. will be 1,100, and the contract speed, which it is hoped will be exceeded, is 18 knots. A new torpedo-cruiser, the "Griden," of a similar type to the "Kasarski," is being constructed at Nicolaieff; her armament will be somewhat heavier, and it is hoped she will prove a better sea boat. Her machinery, which is being constructed in the dockyard, and is of the same pattern as the "Kasarski's," is the first to be made without being under the superintendence of foreigners.

The Tzar, according to the "Rasvedchik," has decreed that the two new coast-defence battle ships, built at the new Admiralty and Baltic yards, shall be named the "Admiral Senjavin" and the "Admiral Uschakoff."

We are indebted, among other sources, to the "Times," "Army and Navy Gazette," "Marine-Rundschau," of Berlin, and the "Kronstadtski-Wjästnik," for the information contained in the above notes.

MILITARY.

Home.—The "Revue Militaire de l'Étranger," which, it should be borne in mind, is edited by the État-Major of the French Army, after recapitulating the provisions of the recently issued "Regulations for Mobilization for Home Defence (Regular Forces)," arrives at the following conclusions:—

"Owing to its organization, mode of recruitment, and distribution, the British Army cannot be mobilized under the same conditions as the large Continental armies. Among the numerous causes which combine to retard its mobilization, the following are the most important:—

"1. As the larger units, brigades, divisions, and army corps, do not exist in time of peace, their staffs would have to be formed at the moment of mobilization.

"2. A certain number of auxiliary services are either feebly represented, or even do not exist at all, in time of peace. Thus, the ammunition columns, mounted infantry, and units of the medical service would have to be made up *impromptu* on mobilization or borrowed from the Volunteers, and their formation would certainly cause difficulty and delay.

"3. As the artillery still forms a single regiment, there would result great complication in all the operations of mobilization. Moreover, the number of batteries that it could furnish for the field army is far below the normal requirements.

"4. Recruitment is territorial only in name. As a matter of fact, a very considerable proportion of the men serve in regiments other than that which corresponds to the regimental district of their domicile; so that there would be a great number of individual movements on mobilization taking place.

"5. The number of youths of eighteen years and under who join the Army is very large, and a certain number would have to be sent to the depôt as unfit, which would sensibly reduce the effective peace strength. Of the 36,003 recruits enlisted in 1891, 18,195 were less than nineteen years of age. Only soldiers above twenty years of age are sent to India.

"6. Of the two territorial battalions of an infantry regiment, one is, in principle, stationed in India or in the Colonies; it is, therefore, lost for the purposes of home mobilization. Hence results the necessity of forming the brigades of four battalions

borrowed from four different corps, which cannot be done without serious inconveniences.

"7. Much of the work of mobilization is effected by the depôts. But the depôt of an infantry regiment is usually far away from its two Regular battalions, which would considerably complicate the necessary movements. There is only one depôt for the whole of the cavalry—another source of complications.

"8. Although efforts have been made to decentralize the supply of the army, it can be seen, from the *rôle* played by the central store in Pimlico, how much the mobilization in England differs in this respect from that of the Continental armies. Most of the corps are at a distance from the stores which contain their equipment and material required for mobilization. The movements of material would thus be multiplied.

"9. The drawbacks above mentioned are accentuated by the fact that the corps frequently change stations, quite apart from their movements to India or the Colonies.

"10. The battalions of Militia which form part of the IIIrd Army Corps would be much inferior in quality to those of the Regular Army, as regards men, and especially as regards the officers and non-commissioned officers. The instruction of the Militia, in fact, is analogous to that of the Ersatz in Germany, and their officers are of very little professional value.

"11. The number of horses in the home army (excluding India and the Colonies) is 14,568, not counting officers' chargers; of these only 7,785 belong to the cavalry. It is questionable whether the 14,000 registered horses would suffice to bring these numbers up to the war footing. In time of peace, the establishment of troop horses is as low as 270 for a certain number of regiments, and the highest establishment is 424; so that it is evident that the mobilization of the cavalry would be particularly difficult.

"Some of the difficulties above enumerated could be overcome, but most of them are bound up with the very constitution of the army; nothing but a complete reorganization would get rid of them, and, from all appearances, that is not likely to be realized at present."

Austria-Hungary.—Orders have been given for the issue of fifty of Wilhelmy's saddles to each regiment of cavalry, to be used for horses which have abnormally-shaped or especially sensitive backs. The saddle is one of the Vienna master-saddler's "Gliederbocks," or jointed saddles, the leathern side-bars of which are hinged. According to the "Armeeblatt," this saddle accommodates itself under all circumstances to the horse's back, even when it loses or changes its condition in any way; so that by its use not only are sore backs completely avoided, but any existing sore will quickly be healed. There is no intention of introducing this saddle generally, as the present sealed pattern lasts much longer, is stronger, and is in other respects well-suited for use in the field. ("Militär-Wochenblatt.")

The "Armeeblatt," No. 43, of 1892, gives an account of the progress of the manufacture of smokeless powder for guns by the Nobel Dynamite Company. In the grain form the powder did not come up to the contract requirements, but in consequence of the recommendations of a mixed commission, the members of which represented the military department and the company, the disc form of powder which had been adopted by the manufactory was improved so as to fulfil all the required conditions in the most thoroughly satisfactory way. The powder turned out by the Pressburg manufactury gives a mean initial velocity of 599·8 m. with a mean gas pressure of 2,782 atmospheres, the maximum being 2,904. The Blumau powder gives a mean initial velocity of 600·3 m., with a mean gas pressure of 2,772, and maximum 2,977. The smokeless powder can be used for the magazine rifle (M/88) and carbines, with an alteration of the sights and cartridge case, and for the field-gun with certain modifications of the cartridge, &c. There appear to be no misgivings as to its lasting properties. It has also been proved to be suitable for the 6·5 mm. rifle produced in the factory at Steyr, which gives an initial velocity of 700 m., and it was recognized as being the best of eleven kinds of powder tried in April and May, 1892.

Bulgaria.—Experiments were made at Sofia in October last with a 47-mm. quick-firing gun and a mitrailleuse, both on the Skoda system, with excellent results. The gun, manned by men who had had no previous experience with it, gave 20 shots in 1½ minutes; the mitrailleuse was also satisfactory.

France.—At the end of the autumn of 1892, the active army consisted of 496,954 men, made up as follows:—Contingent of 1889, 80,802; contingent of 1890, 107,283; contingent of 1891, three-year men 105,291; two-year men, 7,665; one-year men, 35,486. Algerian contingent, 2,700; contingent of 1892, 28,287; three-year volunteers, 31,000; four- and five- year volunteers, 45,640; re-engaged, 24,000; commissioned, 3,400; Algerian tirailleurs and Spahis (natives), 14,400: foreign troops, 7,000; prisoners, 4,000. In addition to these there were 27,639 officers, and the gendarmerie, with 25,863 officers and men, making a grand total of 550,456. ("Spectateur Militaire.")

Continued experiments with the Périer biscuit having given favourable results, trials on a large scale are to be made in all the army corps. It is to be used in making the soup in the proportion of 92·5 g. instead of 125 g. of the ordinary bread. ("Militär-Wochenblatt.")

Germany.—Experiments are being made in the Zieten Hussars, in Rathenow, with a new cavalry equipment, invented by the commanding officer of the regiment, Lieut.-Colonel v. Vollard-Bockelberg. A squadron at war strength has been provided with the equipment. The main features are that the carbine is carried on the man's back, and the old shoulder-belt is replaced by a waist-belt, like that of the infantry, which carries pouches containing sixty (instead of thirty) cartridges. ("Armee- u. Marine-Ztg.")

In accordance with an arrangement concluded in December last, the Krupp and Gruson works will be amalgamated for the next twenty-five years. The Krupp establishments at Essen were founded in 1810, but it was not until 1858 that the foundry began to assume the enormous proportions to which it has now attained. The Gruson works were established at Buckau, in 1855. Up to a comparatively recent date, the Krupp works were chiefly engaged in the manufacture of guns, while the Gruson works were more particularly engaged in the production of gun carriages, projectiles, armour-plated cupolas, and naval guns of the revolving type. More recently, however, Krupp began to make armour, while Gruson undertook the manufacture of guns, and the rivalry so engendered being found prejudicial to the respective interests of the two houses, and profitable to foreign industry, the fusion of the two great works has been effected. ("Revue Militaire de l'Étranger.")

Italy.—Cavalry officers are in future to carry their swords on the saddle, as prescribed for the men. Other mounted officers will wear them with slings as heretofore.

In future all persons who belong to the standing army and mobile militia will carry a zinc descriptive label, sown under the collar of the tunic, &c., showing the name, number, and other details regarding the service of the wearer. ("L'Esercito Italiano.")

The "Revue Militaire de l'Étranger," for December, 1892, gives a short description of a new military "bicyclette" which can be taken to pieces and carried on the person when necessary.

Netherlands.—It is believed that the Mannlicher rifle (calibre 6·5 mm.) manufactured by the Steyr small-arms factory will be selected for the rearmament of the Netherlands army. The field-firing exercises carried out by battalions give excellent results. Experiments on living horses demonstrated the great penetrative power of the bullet, and further trials on the dead bodies of the animals showed the great superiority of the new sword-bayonet over the old three-edged

pattern. The adoption of the rifle depends, however, on the experiment to be carried out by the colonial troops in Atcheen. ("Vedette.")

Switzerland.—The permanent staff for the care of the Gothard works (the creation of which was necessitated by the fact that there is no standing army in Switzerland) has been fixed by the Federal Council. The central control is vested in the Chief of the Artillery, Chief of the Engineers, and Chief of Materials. There is a special Administrative Officer for the south front, and also for the works in Andermatt and the Furka, under whom are the necessary non-commissioned officers, mechanics, &c., for the care of the forts. The special guard for Fort Airolo consists of 9 non-commissioned officers and 24 men; for the works at Stuli (above Airolo), there are 3 non-commissioned officers and 6 men; and for the works at Andermatt (Forts Bühl and Bälzberg) 16 men. These men are volunteers from the fortress artillery and receive a daily pay of 4½ francs for non-commissioned officers and 4 francs for the men, out of which they have to find their own subsistence.

Of the 150,000 rifles of the 1889 pattern required for the rearmament of the Swiss Army, 120,000 had been issued at the end of 1892. The whole of the *élite* (except the special arms), and the landwehr of one of the four army corps, have now received the new arm, and the remaining 30,000 rifles are to be issued during the year.

In future the new Prussian spelling is to be used in all Swiss official writings in the German language. ("Militär-Wochenblatt.")

FOREIGN PERIODICALS.

MILITARY.

Militär-Wochenblatt.—No. 1. 4th January. "The Fights about Le Bourget" (a favourable criticism of Major Kunz's book). "The Simplification of Field-Gun Ammunition" and "Firing at Short Distances." No. 2. 7th January. "More about the 5th Cavalry Division on the 15th August, 1870." "The Normal Position" (remarks on Captain Selliers' "Études de Tactique Défensive-Offensive. Positions de Combat et Manière de les occuper"). "Infantry Pioneers' Duties in France." "Experiments with Armour Plates in Russia." "An American Opinion of the Distance Ride between Berlin and Vienna." No. 3. 11th January. "The Great Firing Exercises of the French Artillery, and the experience thereby gained" (long and important article). "Italian Budget, Military and Naval." "The Roumanian Fortifications on the line Fokschani—Namalosa—Galatz." No. 4. 14th January. "In Memory of Prince Kraft zu Hohenlohe-Ingelfingen" (a retrospect of his works on artillery). "Our Infantry." "The Present Organization and Distribution of the French Artillery." No. 5. 18th January. "The Military Training of Youth." No. 7. "The Training of Officers and N.C. Officers in the Swedish Army."

Beiheft zum Militär-Wochenblatt, 1893, Heft 1.—"My Distance Ride from Berlin to Vienna." By Rittmeister Freiherr v. Reitzenstein (winner of the 2nd Prize). "The Pursuit from Jena to Prenzlau." By Colonel v. Lettow-Vorbeck. Heft 2. "Sketch of the History of the Prussian Engineer Committee during the first Twenty-five Years of its Operation."

Journal des Sciences Militaires.—December, 1892. "Strategy of Marches." By General Lewal (*continued*). "The Battle of Châtillon" (*continued*). "Employment of Infantry Scouts in the Preliminary Stages of the Fight." "Crypto-

graphy." "Systems of Firing in the Field Artillery." "Education of the Soldier" (*continued*).

Spectateur Militaire.—1st January, 1893. "Studies on the Campaign of the Loire." "Tactics of the Wars of the Middle Ages." "Provisioning of Intrenched Camps" (*continued*). 15th January, 1893. "Operations of Junot and Wellesley before Lisbon" (August, 1808). "Tactics of the Wars of the Middle Ages" (*continued*). "Studies on the Campaign of the Loire" (*continued*). "Provisioning of Intrenched Camps" (*continued*).

Revue Militaire de l'Étranger.—No. 781. December, 1892.—"The New German Field Artillery Regulations." "Military Direction of Navigable Ways in Italy" (*continued*). "Description of New Rifle for the Netherlands Army." January, 1893. "Tactical Observations of General Dragomirov." "Mobilization of the British Army." "War Budget of Norway." "Military Working of a Railway in Spain." "Résumé of the Contemplated Augmentation of the German Army."

Revue de Cavalerie.—93rd livr. December, 1892. "Cavalry acting with Isolated Detachments" (*continued*). "The Employment of made up Regiments at the (French) Manœuvres of 1892."

NOTICES OF BOOKS.

Taschenkalender für das Heer. By FIRCKS. Berlin: A. Bath, 1893. 4 mks.

This annual publication has for many years enjoyed a wide circulation amongst the officers and officials of the German army, as affording a very complete and general guide to the administration of the German land forces in peace time. The manual, which is contained in 472 closely printed pages, is divided into fourteen sections or chapters, giving in a concise form the main features of the laws and regulations dealing with universal service, recruiting, discharge, pensions, employment in civil State departments after discharge, remounts, military establishments and instructional courses, interior economy, military duties and instruction, arms, clothing and equipment, pay, rations, &c. To those officers who may be desirous of comparing the system of administration in our own army with that which prevails in Germany this complete compendium will prove very useful. It should be noted, however, that the work does not deal with the organization of the forces of the German Empire, nor with their administration in war.

Taschenkalender für Beamte der Militär-Verwaltung. By SIEKMANN. Berlin: A. Bath, 1893. 4 mks.

This manual comprises general information relating only to the regulations for the administrative branches of the German army. It deals exhaustively with the instructions governing the personnel and matériel of these branches of the Service. It may be mentioned, with regard to the title of the work, that the word "Beamte," or "officials," is used, in contradistinction to "officers," for the commissioned personnel of the Administrative Services, which include the Pay Department, the Medical and Veterinary Departments, the Chaplain's Department, and the branches dealing with barracks, supplies, &c. A useful portion of this manual is that formed by the first three chapters, which give general statistics of the German Empire, tables of organization and distribution of the German military and naval forces.

Offizier-Taschenbuch auf das Jahr 1893. Brunswick: Gebrüder Haering. 4 mks.

As a manual dealing with the organization of the German army and its tactical

regulations, this handbook, which now appears for the first time, forms a useful supplement to Fircks' "Taschenkalender," which deals principally with the German system of military administration. The work has been compiled by several officers, and contains, in addition to the matter dealing with the German forces, useful information with regard to the general organization and armament of other European armies. The book includes a map, showing the railways of Central Europe.

Karte der Garnisonen des Reichsheeres, 1891. Scale 1/900,000. Verlag des Berliner Lithogr. Instituts, Berlin, W. 1 mk.

This distribution map of the German army shows the strength of each garrison of the German Empire down to the lowest unit. The army corps districts are represented by different colours, and the number of each unit is shown in figures. Being an official publication, the map may be thoroughly relied upon, and it may be said to form the most useful map of reference to be found dealing with the distribution of the German army in detail.

Outlines of Modern Tactics. By Lieutenant-Colonel E. GUNTER. London: Clowes, 1893. Pp. 234. Price 7*s.*

The *raison d'être* of this, the latest addition to the handbooks of tactics, is thus expressed in the author's preface. "In the following notes I have endeavoured to put in concise form and simple language those main principles of modern tactics which are generally accepted as established by the experience of modern war, or as the natural consequences of modern improvements in weapons, &c. I hope the notes may be of use to officers instructing others, or working themselves, especially to officers of Militia, Yeomanry, and Volunteers. The object is to give a general idea of the subject, before a close study of the works fully dealing with it, by Hamley, Clery, Home, and others, is entered on, which must be done to understand the *reasons for* the established principles."

The book is well planned and well printed, and the author has managed to compress a considerable amount of useful information into a comparatively small space. A noticeable feature is the frequent reference to the authorized regulations and other standard works. The diagrams with which the book is illustrated are clear, and the author is very properly careful to impress upon the reader that they are only intended to illustrate the principles of the text, and not to indicate any exact distribution, formation, &c., as this must always vary with the country, &c. As the author observes in his preface, in a book like this, errors must occur; but those which we have noticed are generally such as the student who refers to the text-books indicated for his guidance will be able to correct without much difficulty.

The British War Horse, showing:—How the Breed can be improved. The Numbers increased so as to become adequate to the Country's needs. The Cost lessened. The Breeder encouraged without any extra charge on the State. By Lieutenant-Colonel UNDERWOOD, late 4th Hussars. London: Gale and Polden (no date). Pp. 16. Price 6*d.*

The long title of this little pamphlet indicates its purport. It contains in fact the general outline of a scheme for supplying the country with a reserve of cavalry horses, and it may be read with advantage by officers and others who take an interest, as all should do, in that important factor in the national means of defence.

Naval and Military Funds and Institutions. By Colonel GILDEA, Commanding 4th Battalion, Royal Warwickshire Regiment. 2nd edition. London: Eyre and Spottiswoode, 1893. Pp. 139. Price 1*s.* 6*d.*

The object of this useful little book is to supply naval and military men, and also the general public, with a complete guide as to the objects of all the institutions, charitable and otherwise, connected with the Services. There are probably few persons who have not been asked at some time or other for help or advice as regards funds, asylums, schools, societies, organized employment, &c., for the benefit of officers and men who have served, and of those dependent on them; and

all the information that is likely to be required under this head is given in Colonel Gildea's carefully compiled handbook. Among other things is a complete list of the societies established for the benefit or convenience of men serving with the colours and of their families.

List of Recent Foreign Books (Military).

Études de Tactique Défensive-Offensive. Positions de Combat et Manière de les occuper. Par le Chevalier A. de Selliers de Moranville. Brussels: Spineux, 1893. 4 fr.

Études pratique de Guerre. Par le Général Lamiraux. With plates. 2nd Edition. Paris: Lavauzelle. 6 fr.

L'Artillerie de Campagne en liaison avec les autres Armes. Par le Colonel Langlois. With atlas. Paris: Baudoin, 1892. Tome 1, 9 fr.; Tome 2, 7 fr.

La Campagne de 1814, and *La Cavalerie des Armées Alliées pendant la Campagne de* 1814. Par Weil. 2 vols. Paris: Baudoin, 1892. 8 fr. each.

Nouveau Dictionnaire Militaire. Par un Comité d'Officiers. 850 pages, with illustrations. Paris: Baudoin, 1892. 15 fr.

Nouvelles Études sur la Bataille de Woerth, an authorized French translation of Lieut.-General Boguslawski's work. By Captain Jung. Antwerp: Legros, 1892.

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Der Grenzdetachementskrieg und die Kavallerie-Unternehmungen in Feindesland während der Mobilmachung. Kriegsgeschichtliche und taktische Studie. By Colonel Cardinal von Widdern. With sketches. Berlin: Eisenschmidt, 1892. 5.50 mks.

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Geschichte des K. Preussischen 2. *Garde-Regiments zu Fuss.* By Major Freiherr v. Lüdinghausen gen. Wolff. 2nd Edition. With maps. Berlin: Mittler, 1892. 17.50 mks.

Kriegsgeschichtliche Beispiele der Feldbefestigung und des Festungskrieges. By Major Krebs. With sketches. 2nd edition. Berlin: Mittler, 1892. 5 mks.

Praktische Taktik und taktische Theorie. By General v. Scherff. Berlin: Luckhardt, 1893. 2 mks.

Regeln der Feuer-Leitung der Feld- und Gebirgs-Batterie. A German translation of the Official Russian Regulation. By Major von Seydlitz. Dresden: Höckner, 1893.

Schwarze Husaren. Geschichte des 1. *Leib-Husaren-Regiments Nr.* 1. *und des* 2. *Leib-Husaren Regiments Nr.* 2. By Major Mackensen. 2 vols. With illustrations, maps, &c. Berlin: Mittler. 40 mks.

Note.—It is intended to give a list of recent naval books, &c., in an early number of the Journal.—Editor.